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SUPPLEMENTAL DATA REPORT ON INVESTIGATIONS OF MARINE DISSOLVED --ETC(U)
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GRADUATE SCHOOL OF OCEANOGRAPHY
UNIVERSITY OF RHODE ISLAND
KINGSTON, RHODE ISLAND

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SUPPLEMENTAL DATA REPORT ON INVESTIGATIONS
OF MARINE DISSOLVED ORGANIC MATTER PROTONATION EQUILIBRIA

Reference No. 78-1

by

Douglas L. Huizenga

Approved for distribution Sam R. Kesten

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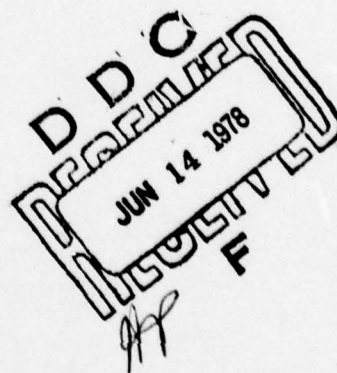


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1. Introduction

This data report is a supplemental record of data and calculations related to the M.S. thesis of Douglas L. Huizenga, Protonation Characteristics of the Dissolved Organic Matter in Seawater (University of Rhode Island, 1977). The individual fraction titration data, calculated organic matter titration curves, model parameters, and copies of computer programs are presented.

Organic Matter Samples

The organic matter samples investigated are listed in Table 1. The location, date, and depth of sample collection are given. A specific blank is associated with each sample and is given in the last column of Table 1. Blanks were prepared to be equivalent on a volume basis with the samples. The last ten samples were all handled in the same manner and only have a single blank sample.

Titration Names

Each titration was assigned a unique name, such as GG1371A. The first letter(s) plus the first number ("GG1") indicates the sample code and fraction number (here sample GG, fraction 1). The rest of the name specifies the lab book page number for the titration (here page 371A). A few titrations of 0.7M NaClO_4 without added sample were performed. The names for titration of medium alone begin with "MD". A fraction number of 0 indicates

that the sample was not obtained by the charcoal isolation procedure. A fraction number of 4 indicates a sample where all three fractions from charcoal were combined.

Titration Performed

Titration information for every titration is given in Table 2. The order of samples in this table is also the order in which the titration data are presented. The use of the titration parameters is given in Appendix A of the thesis. All the information about a titration that is needed to do the calculations is given in this table.

Table 1. Collection and sample isolation information for samples. Concentrations are mg OC/l.

Sample Code	Sample	Location	Date	Depth	[OC]		Isolation	Blank
					Original	after		
					0	1	2	3
D	Sediment Fulvic Acid Solution A	W Passage Narra. B.		sediment	298 ^a	42	281	213
S	Sediment Fulvic Acid Solution B	W Passage Narra. B.		sediment	122 ^b	79	74	100
CC	Diatom Cellular Material	Laboratory culture			32 ^c		CC4 - 102 ^d	00
N	Narragansett Bay A	41°34'N 71°24'W	16March76	surface		230	117	217
P	Narragansett Bay B	41°34'N 71°24'W	13April76	surface		235	188	202
GG	Coastal Equatorial Atl., surface	4°18'N 7°00'W	5June76	25m		349	347	266
HH	Equatorial Atlantic, surface	2°33'S 7°00'W	7June76	25m		362	333	318
II	Equatorial Atlantic, intermediate	6°24'N 25°36'W	12June76	1500m		250	185	178
JJ	Coastal Peru, moderate productivity	13°00'S 76°42'W	15April75	25m		329	258	298
KK	Sargasso Sea, intermediate	36°35'N 66°03'W	14May74	1000m		293	205	188
LL	Coastal Peru, O ₂ minimum	11°00'S 78°30'W	18April75	50-75m		271	256	211
MM	Coastal Peru, high productivity	13°25'S 76°35'W	10April75	10-20m		276 ^e	264	303
NN	Coastal Peru, low productivity	15°20'S 78°30'W	13April75	25-50m		424	324	305
OO	Mixed River Water (Blackstone, Pawtuxet, and Taunton Rivers)		14Feb77			592	722	625
QQ	Block Island Sound Water, surface, coastal	5.5km S Point Judith, RI	9March77	surface		383	365	293

^a medium is 0.5M NaCl.

^b medium is 0.2M NaCl.

^c seawater medium.

^d Three fractions from charcoal were combined to give one sample designated CC4.

^e Sample was filtered through 0.4 filter due to presence of flocs.

Table 2. Titration information.

Type, OM is an organic matter sample

BL is a blank sample

w , weight of water in sample at start of titration, g

[OM], amount of organic carbon in sample at start of titration, mg

E , pH electrode calibration E , mV

ρ_t , grams of titrant solution / ml

w_{H_2O} , grams of H_2O / gram titrant solution

OH_t , moles of OH^- / kg titrant

Date, date when titration was performed

Blank, blank appropriate for that sample

Sample Weight, weight of sample taken initially, g

I , ionic strength of solution at start of titration, m

Factor, that fraction of initial sample in the test solution

Sample	Type	w _o	[OM]	E _s	ρ _t	w _{H₂O}	OH _t	Date	Blank	Sample Weight	I	Factor
D0185A	OM	53.337	1.49	417.67	1.0399	0.92466	0.045906	01/02/76	C0184A	5.0101	0.682	1.0000
C0184A	BL	53.371	-	418.16	1.0399	0.92466	0.045906	01/02/76	-	5.0537	0.682	1.0000
D0189B	OM	53.369	1.49	421.17	1.0390	0.92476	0.047512	01/24/76	C0188A	5.0114	0.682	1.0000
C0188A	BL	53.394	-	420.79	1.0390	0.92476	0.047512	01/24/76	-	5.0627	0.682	0.9999
D1215A	OM	49.795	0.84	418.26	1.0387	0.92419	0.042600	03/01/76	C1213B	19.9733	0.420	0.9979
C1213B	BL	46.200	-	419.12	1.0387	0.92419	0.042600	03/01/76	-	19.9567	0.420	0.9287
D2218B	OM	33.853	0.97	418.92	1.0387	0.92419	0.042600	03/04/76	C2217A	3.4768	0.608	0.9968
C2217A	BL	33.850	-	419.54	1.0387	0.92419	0.042600	03/04/76	-	3.4554	0.608	0.9853
D3222A	OM	32.705	0.74	420.02	1.0387	0.92419	0.042600	03/11/76	C3220B	3.4765	0.626	0.9954
C3220B	BL	32.757	-	419.62	1.0387	0.92419	0.042600	03/11/76	-	3.4928	0.626	0.9962
S0313A	OM	12.306	0.96	428.07	1.0406	0.92199	0.046280	07/07/76	T0313A	7.9546	0.699	0.9915
T0313A	BL	12.439	-	428.07	1.0406	0.92199	0.046280	07/07/76	-	7.9549	0.699	0.9965
S0296A	OM	16.479	0.99	429.02	1.0406	0.92199	0.046280	06/23/76	T0296A	8.1629	0.701	0.9924
T0296A	BL	16.622	-	429.02	1.0406	0.92199	0.046280	06/23/76	-	8.2276	0.701	0.9995
S1299B	OM	18.957	0.94	429.08	1.0406	0.92199	0.046280	06/26/76	T1299B	11.9499	0.683	0.9909
T1299B	BL	18.902	-	429.08	1.0406	0.92199	0.046280	06/26/76	-	11.9334	0.687	0.9944
S2303A	OM	17.872	0.80	429.04	1.0406	0.92199	0.046280	06/28/76	T2303A	10.9063	0.700	0.9909
T2303A	BL	17.940	-	429.04	1.0406	0.92199	0.046280	06/28/76	-	10.9040	0.700	0.9944
S3306B	OM	16.334	0.98	429.87	1.0406	0.92199	0.046280	07/02/76	T3306B	9.9038	0.700	0.9910
T3306B	BL	16.422	-	429.87	1.0406	0.92199	0.046280	07/02/76	-	9.8938	0.700	0.9973
CC0362B	OM	33.080	0.99	420.10	1.0387	0.93756	0.047586	11/14/76	DD0362B	31.8200	-	1.0000

Seawater medium, w_o is total weight of sol'n.

Sample	Type	w _o	[OM]	E _o	ρ _t	w _{H₂O}	OH _t	Date	Blank	Sample Weight	I	Factor	
DD0362B	BL	43.870	-	420.10	1.0387	0.93756	0.047386	11/14/76	-	41.8400	-	1.0000	Seawater medium, w _o is total weight of sol'n.
CC0366A	OM	22.894	0.71	419.00	1.0387	0.93756	0.047386	11/19/76	DD0362B	21.9978	-	1.0000	Seawater medium, w _o is total weight of sol'n.
CC4364B	OM	14.518	0.88	419.75	1.0387	0.93756	0.047386	11/17/76	DD4364B	8.8300	0.705	0.9761	
DD4364B	BL	19.955	-	419.75	1.0387	0.93756	0.047386	11/17/76	-	11.980	0.701	0.9856	
N1255B	OM	17.251	2.06	425.20	1.0387	0.92419	0.042600	04/21/76	O1257A	8.9877	0.700	0.9958	
O1257A	BL	11.358	-	425.80	1.0387	0.92419	0.042600	04/21/76	-	5.6759	0.678	0.9978	
N1237A	OM	15.522	0.89	428.82	1.0387	0.92419	0.042600	03/31/76	O1235A	3.9539	0.696	0.9839	
O1235A	BL	17.080	-	428.06	1.0387	0.92419	0.042600	03/31/76	-	3.9761	0.714	0.9940	
N2250B	OM	18.721	1.03	426.14	1.0387	0.92419	0.042600	04/13/76	O2254A	8.8897	0.700	0.9913	
O2254A	BL	13.946	-	425.44	1.0387	0.92419	0.042600	04/13/76	-	7.9750	0.700	0.9954	
N3247B	OM	16.045	1.92	427.12	1.0387	0.92419	0.042600	04/11/76	O3249A	8.9007	0.765	0.9947	
O3249A	BL	14.710	-	426.28	1.0387	0.92419	0.042600	04/11/76	-	7.9475	0.799	0.9908	
P1318A	OM	13.258	1.16	418.25	1.0406	0.92199	0.046280	07/18/76	W1318A	4.9762	0.674	0.9895	
W1318A	BL	13.115	-	418.25	1.0406	0.92199	0.046280	07/18/76	-	4.9555	0.678	0.9869	
P1340B	OM	13.394	1.17	416.71	1.0406	0.92199	0.046280	08/08/76	W1340B	4.9884	0.698	0.9870	
W1340B	BL	13.496	-	416.71	1.0406	0.92199	0.046280	08/08/76	-	4.9729	0.700	0.9930	
P2320A	OM	13.665	0.93	417.07	1.0406	0.92199	0.046280	07/19/76	W2320A	4.9721	0.699	0.9935	
W2320A	BL	13.619	-	417.07	1.0406	0.92199	0.046280	07/19/76	-	4.9648	0.700	0.9935	
P2338B	OM	13.629	0.94	417.77	1.0406	0.92199	0.046280	08/07/76	W2338B	4.9822	0.700	0.9952	
W2338B	BL	13.626	-	417.77	1.0406	0.92199	0.046280	08/07/76	-	4.9718	0.701	0.9958	
P3322A	OM	13.554	0.99	415.32	1.0406	0.92199	0.046280	07/20/76	W3322A	4.9537	0.700	0.9926	

Sample	Type	w _o	[OM]	E _o	ρ_t	w _{H₂O}	OH _t	Date	Blank	Sample Weight	I	Factor
W3322A	BL	13.570	-	415.32	1.0406	0.92199	0.046280	07/20/77	-	4.9546	0.700	0.9939
GG1371A	OM	13.883	1.12	417.43	1.0387	0.93756	0.047386	12/08/76	FF1371A	3.2336	0.695	0.9891
GG1392A	OM	13.886	1.12	418.13	1.0387	0.93756	0.047386	02/10/77	FF1371A	3.2404	0.695	0.9895
GG2373A	OM	13.872	1.04	417.33	1.0387	0.93756	0.047386	12/09/76	FF2373A	3.0172	0.700	0.9918
GG2421B	OM	13.844	1.04	415.32	1.0387	0.93756	0.047386	03/28/77	FF2373A	3.0127	0.700	0.9909
GG3374B	OM	13.764	1.05	417.38	1.0387	0.93756	0.047386	12/10/76	FF3374B	4.0281	0.700	0.9831
GG3421B	OM	13.831	1.06	415.37	1.0387	0.93756	0.047386	03/28/77	FF3374B	4.0301	0.699	0.9902
HH1377B	OM	13.911	1.17	416.33	1.0387	0.93756	0.047386	12/16/76	FF1371A	3.2269	0.694	0.9900
HH1399C	OM	13.963	1.18	416.13	1.0387	0.93756	0.047386	03/02/77	FF1371A	3.3059	0.691	0.9899
HH2378B	OM	13.824	0.99	416.93	1.0387	0.93756	0.047386	12/17/76	FF2373A	3.0147	0.700	0.9889
HH2399B	OM	13.806	0.99	415.93	1.0387	0.93756	0.047386	03/01/77	FF2373A	3.0102	0.700	0.9886
HH3378B	OM	13.867	1.27	416.33	1.0387	0.93756	0.047386	12/17/76	FF3374B	4.0430	0.699	0.9902
HH3399B	OM	13.807	1.27	416.33	1.0387	0.93756	0.047386	03/01/77	FF3374B	4.0435	0.700	0.9891
II1380A	OM	13.989	1.09	416.23	1.0387	0.93756	0.047386	12/18/76	FF1380A	4.3961	0.693	0.9945
II1399C	OM	13.975	1.08	415.73	1.0387	0.93756	0.047386	03/02/77	FF1380A	4.3805	0.692	0.9916
II2381B	OM	13.883	1.09	416.33	1.0387	0.93756	0.047386	12/19/76	FF2381B	5.9604	0.699	0.9908
II2404A	OM	13.818	1.09	415.43	1.0387	0.93756	0.047386	03/03/77	FF2381B	5.9520	0.700	0.9889
II3382B	OM	13.818	1.09	415.78	1.0387	0.93756	0.047386	12/20/76	FF3382B	6.1788	0.700	0.9880
II3404A	OM	13.791	1.10	415.63	1.0387	0.93756	0.047386	03/03/77	FF3382B	6.2285	0.700	0.9881
JJ1383B	OM	13.918	1.06	415.53	1.0387	0.93756	0.047386	12/23/76	FF1371A	3.2282	0.695	0.9912
JJ1407A	OM	13.888	1.05	416.57	1.0387	0.93756	0.047386	03/09/77	FF1371A	3.2307	0.695	0.9896

Sample	Type	w _o	[OM]	E _o	ρ_t	w _{H₂O}	OH _t	Date	Blank	Sample Weight	I	Factor
JJ2386A	OM	13.835	1.54	417.83	1.0387	0.93756	0.047386	01/05/77	FF2381B	5.9584	0.700	0.9891
JJ2405A	OM	13.792	1.26	415.13	1.0387	0.93756	0.047386	03/04/77	FF2381B	4.9578	0.701	0.9883
JJ3387A	OM	13.834	1.20	416.93	1.0387	0.93756	0.047386	01/06/77	FF3374B	4.0317	0.698	0.9874
JJ3405A	OM	13.767	1.18	415.33	1.0387	0.93756	0.047386	03/04/77	FF3374B	4.0258	0.700	0.9872
KK1383B	OM	13.748	0.95	414.98	1.0387	0.93756	0.047386	12/23/76	FF1371A	3.2299	0.696	0.9816
KK1407A	OM	13.962	0.94	416.67	1.0387	0.93756	0.047386	03/09/77	FF1371A	3.2288	0.693	0.9923
KK2386A	OM	13.912	1.22	417.13	1.0387	0.93756	0.047386	01/05/77	FF2381B	5.9552	0.698	0.9920
KK2408A	OM	13.802	1.21	416.72	1.0387	0.93756	0.047386	03/10/77	FF2381B	5.9762	0.700	0.9878
KK3387A	OM	13.812	1.16	416.83	1.0387	0.93756	0.047386	01/06/77	FF3382B	6.1939	0.700	0.9877
KK3408A	OM	13.784	1.15	417.17	1.0387	0.93756	0.047386	03/10/77	FF3382B	6.1976	0.700	0.9871
LL1392A	OM	14.020	1.18	417.63	1.0387	0.93756	0.047386	02/10/77	FF1380A	4.3979	0.690	0.9921
LL1410A	OM	14.001	1.18	416.42	1.0387	0.93756	0.047386	03/12/77	FF1380A	4.4065	0.691	0.9921
LL2393A	OM	13.856	1.51	418.03	1.0387	0.93756	0.047386	02/11/77	FF2381B	5.9626	0.700	0.9903
LL2409A	OM	13.831	1.51	416.12	1.0387	0.93756	0.047386	03/11/77	FF2381B	5.9562	0.700	0.9902
LL3393A	OM	13.816	1.29	418.33	1.0387	0.93756	0.047386	02/11/77	FF3382B	6.1891	0.700	0.9879
LL3409A	OM	13.800	1.29	416.42	1.0387	0.93756	0.047386	03/11/77	FF3382B	6.1876	0.701	0.9897
MM1396A	OM	13.957	1.21	416.53	1.0387	0.93756	0.047386	02/14/77	FF1380A	4.4118	0.699	0.9911
MM1410A	OM	14.011	1.20	415.87	1.0387	0.93756	0.047386	03/12/77	FF1380A	4.3914	0.690	0.9918
MM2394B	OM	13.806	1.55	417.88	1.0387	0.93756	0.047386	02/12/77	FF2381B	5.9519	0.700	0.9876
MM2411A	OM	13.784	1.55	415.67	1.0387	0.93756	0.047386	03/13/77	FF2381B	5.9609	0.700	0.9868
MM3394A	OM	13.782	1.21	417.43	1.0387	0.93756	0.047386	02/12/77	FF3374B	4.0434	0.700	0.9866

Sample	Type	w _o	[OH]	E _o	ρ_t	w _{H₂O}	OH _t	Date	Blank	Sample Weight	I	Factor
NN3411A	OM	13.851	1.21	415.87	1.0387	0.93756	0.047386	03/13/77	FF3374B	4.0315	0.698	0.9896
NN1396A	OM	13.935	1.36	416.98	1.0387	0.93756	0.047386	02/14/77	FF1371A	3.2355	0.694	0.9918
NN1413A	OM	13.982	1.35	414.67	1.0387	0.93756	0.047386	03/15/77	FF1371A	3.2156	0.692	0.9928
NN2395A	OM	13.819	1.91	417.13	1.0387	0.93756	0.047386	02/13/77	FF2381B	5.9570	0.700	0.9883
NN2412A	OM	13.825	1.91	415.37	1.0387	0.93756	0.047386	03/14/77	FF2381B	5.9633	0.700	0.9907
NN3395A	OM	13.837	1.22	416.73	1.0387	0.93756	0.047386	02/13/77	FF3374B	4.0309	0.700	0.9900
NN3412A	OM	13.828	1.22	415.57	1.0387	0.93756	0.047386	03/14/77	FF3374B	4.0214	0.700	0.9915
OO1413A	OM	13.806	1.89	414.57	1.0387	0.93756	0.047386	03/15/77	FF1371A	3.2350	0.696	0.9850
OO1423A	OM	13.823	1.89	414.87	1.0387	0.93756	0.047386	03/27/77	FF1371A	3.2270	0.696	0.9871
OO2414A	OM	13.843	2.15	414.27	1.0387	0.93756	0.047386	03/16/77	FF2373A	3.0038	0.700	0.9921
OO2420A	OM	13.797	2.15	416.37	1.0387	0.93756	0.047386	03/27/77	FF2373A	3.0087	0.700	0.9887
OO3414A	OM	13.935	2.49	414.07	1.0387	0.93756	0.047386	03/16/77	FF3374B	4.0361	0.694	0.9881
OO3420A	OM	13.796	2.49	416.22	1.0387	0.93756	0.047386	03/27/77	FF3374B	4.0353	0.700	0.9877
QQ1423A	OM	13.899	1.23	415.07	1.0387	0.93756	0.047386	03/29/77	FF1371A	3.2523	0.695	0.9903
QQ1426A	OM	13.928	1.22	414.27	1.0387	0.93756	0.047386	04/01/77	FF1371A	3.2238	0.694	0.9914
QQ2424A	OM	13.837	1.10	414.92	1.0387	0.93756	0.047386	03/30/77	FF2373A	3.0122	0.698	0.9885
QQ2425A	OM	13.873	1.10	414.27	1.0387	0.93756	0.047386	03/31/77	FF2373A	3.0140	0.698	0.9915
QQ3424A	OM	13.843	1.17	414.77	1.0387	0.93756	0.047386	03/30/77	FF3374B	4.0311	0.700	0.9906
QQ3425A	OM	13.820	1.18	414.57	1.0387	0.93756	0.047386	03/31/77	FF3374B	4.0297	0.699	0.9895
FF1371A	BL	13.982	-	417.63	1.0387	0.93756	0.047386	12/08/76	-	3.2287	0.695	0.9937
FF2373A	BL	13.888	-	417.83	1.0387	0.93756	0.047386	12/09/76	-	3.0116	0.699	0.9908

Sample	Type	w _o	[OM]	E _o	ρ_t	w _{H₂O}	OH _t	Date	Blank	Sample Weight	I	Factor	
FF3374B	BL	13.857	-	417.23	1.0387	0.93756	0.047386	12/10/76	-	4.0302	0.700	0.9893	
FF1380A	BL	13.971	-	416.63	1.0387	0.93756	0.047386	12/18/76	-	4.3965	0.691	0.9902	
FF2381B	BL	13.858	-	416.83	1.0387	0.93756	0.047386	12/19/76	-	5.9585	0.699	0.9893	
FF3382B	BL	13.870	-	416.53	1.0387	0.93756	0.047386	12/20/76	-	6.1908	0.700	0.9908	
S1315A	OM	12.370	0.58	431.30	1.0406	0.92199	0.046280	07/13/76	T1315A	7.3704	0.698	0.9952	Special. Filter through 0.2 μ filter.
T1315A	BL	16.378	-	431.30	1.0406	0.92199	0.046280	07/13/76	-	9.9581	0.701	0.9796	Special. Unfiltered.
S1311A	OM	14.051	0.63	428.18	1.0406	0.92199	0.046280	07/06/76	T1311A	7.9776	0.690	0.9945	Special. NaCl medium.
T1311A	BL	13.916	-	428.18	1.0406	0.92199	0.046280	07/06/76	-	7.9699	0.693	0.9907	Special. NaCl medium.
GG1390A	OM	13.956	1.12	416.53	1.0387	0.93756	0.047386	02/03/77	FF1371A	3.2433	0.693	0.9899	Special. N ₂ bubbled for NH ₃ removal.
GG2390A	OM	13.815	1.04	416.93	1.0387	0.93756	0.047386	02/03/77	FF2373A	3.0260	0.699	0.9900	Special. N ₂ bubbled for NH ₃ removal.
GG3391A	OM	13.856	1.06	416.68	1.0387	0.93756	0.047386	02/04/77	FF3374B	4.0448	0.697	0.9883	Special. N ₂ bubbled for NH ₃ removal.
QQ1426A	OM	13.786	1.22	414.27	1.0387	0.93756	0.047386	04/01/77	MSW427A	3.2298	0.694	0.9903	Ca, Mg, Na ClO ₄ medium.
MSW427A	MD	14.938	-	414.22	1.0387	0.93756	0.047386	04/01/77	-				Ca, Mg, Na ClO ₄ medium with no blank added.
QQ1431A	OM	14.108	1.23	416.12	1.0387	0.93756	0.047386	04/07/77	FF1371A	3.2300	0.698	0.9924	Special. 1.9 μ moles Cu ²⁺ added to solution.
QQ1433-6	OM	13.874	0.99	416.27	1.0387	0.93756	0.047386	04/19/77	FF1371A	3.2300	0.694	0.9879	UV irradiate OM 1 Hr. (OC is measured)
QQ1433-4	OM	13.911	0.95	416.47	1.0387	0.93756	0.047386	04/19/77	FF1371A	3.2277	0.695	0.9911	UV irradiate OM 3 Hr. (OC is measured)
QQ1433-2	OM	13.910	0.70	416.97	1.0387	0.93756	0.047386	04/19/77	FF1371A	3.2271	0.694	0.9904	UV irradiate OM 10.5 Hr. (OC is measured)
QQ1437A	OM	13.873	0.42	426.57	1.0387	0.93756	0.047386	07/02/77	FF1437A	1.0975	0.698	0.9936	Special. Low [OC].
FF1437A	BL	13.914	-	427.27	1.0387	0.93756	0.047386	07/02/77	-	1.0932	0.696	0.9926	Special. Small amount of blank.
QQ1435A	OM	13.980	1.24	427.17	1.0387	0.93756	0.047386	06/29/77	FF1371A	3.2272	0.692	0.9913	Forward titration - OH titrant
		17.081	1.24	427.17	1.0376	0.92180	0.052785						Back titration - H titrant

Sample	Type	w.	[OH]	E.	ρ_t	w_{H_2O}	OH _t	Date	Blank	Sample Weight	Factor
MD223B	MD	39.440	-	421.37	1.0387	0.92419	0.042600	03/14/76			
MD298B	MD	70.700	-	429.22	1.0406	0.92199	0.046280	06/26/76			
MD369A	MD	65.317	-	419.10	1.0387	0.93756	0.047386	12/06/76			
MD376B	MD	83.307	-	416.63	1.0387	0.93756	0.047386	12/15/76			
MD419B	MD	94.271	-	416.12	1.0387	0.93756	0.047386	03/25/77			

II. Acid-Base Titration Data

The data for titration of organic matter samples and blanks are presented in Table 3.

Table 3. Experimental data from titrations. Ordering of data is nearly that of Table 2.

ML, volume of titrant added, ml

EH, potential of electrode pair, mV

D0185A			C0184A			D0189B			C0188A			D1215A			C1213B		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	273.00		0.000	273.30		0.000	303.10		0.000	302.60		0.000	299.80		0.000	300.60	
0.200	271.65		0.200	271.80		0.110	302.80		0.100	302.30		0.110	299.50		0.100	300.30	
0.400	270.20		0.400	270.40		0.225	302.50		0.210	302.00		0.210	299.20		0.200	300.00	
0.600	268.70		0.600	268.80		0.340	302.20		0.320	301.70		0.280	299.00		0.300	299.80	
0.800	266.80		0.800	266.90		0.455	301.90		0.440	301.40		0.390	298.20		0.400	299.50	
1.000	264.90		1.000	265.00		0.570	301.60		0.550	301.10		0.490	297.50		0.500	299.20	
1.200	263.00		1.200	263.10		0.685	301.30		0.660	300.80		0.590	296.80		0.600	299.00	
1.400	261.10		1.400	261.20		0.800	301.00		0.770	300.50		0.710	296.00		0.700	298.80	
1.600	259.20		1.600	259.30		0.915	300.70		0.880	299.90		0.820	295.20		0.800	298.00	
1.800	257.30		1.800	257.40		1.030	300.40		0.990	299.10		0.930	294.40		0.900	296.80	
2.000	255.40		2.000	255.50		1.145	300.10		1.100	298.30		1.040	293.60		1.000	295.00	
2.200	253.50		2.200	253.60		1.260	299.80		1.200	297.50		1.150	292.80		1.100	293.80	
2.400	251.60		2.400	251.70		1.375	299.50		1.300	296.20		1.260	292.00		1.200	292.00	
2.600	249.70		2.600	249.80		1.490	299.20		1.400	294.90		1.370	291.20		1.300	290.00	
2.800	247.80		2.800	247.90		1.605	298.90		1.500	293.60		1.480	290.40		1.400	288.80	
3.000	245.90		3.000	246.00		1.720	298.60		1.600	292.30		1.590	289.60		1.500	287.00	
3.200	244.00		3.200	244.10		1.835	298.30		1.700	291.00		1.690	288.80		1.600	285.20	
3.400	242.10		3.400	242.20		1.950	298.00		1.800	289.70		1.790	288.00		1.700	283.60	
3.600	240.20		3.600	240.30		2.065	297.70		1.900	288.40		1.880	287.20		1.800	282.20	
3.800	238.30		3.800	238.40		2.180	297.40		2.000	287.10		1.970	286.40		1.900	280.20	
4.000	236.40		4.000	236.50		2.295	297.10		2.100	285.80		2.060	285.60		2.000	278.00	
4.200	234.50		4.200	234.60		2.410	296.80		2.200	284.50		2.160	284.40		2.100	276.00	
4.400	232.60		4.400	232.70		2.525	296.50		2.300	283.20		2.260	283.20		2.200	274.00	
4.600	230.70		4.600	230.80		2.640	296.20		2.400	281.90		2.360	282.00		2.300	272.00	
4.800	228.80		4.800	228.90		2.755	295.90		2.500	280.60		2.460	281.00		2.400	270.00	
5.000	226.90		5.000	227.00		2.870	295.60		2.600	279.30		2.560	280.00		2.500	268.00	
5.200	225.00		5.200	225.10		2.985	295.30		2.700	278.00		2.660	279.00		2.600	266.00	
5.400	223.10		5.400	223.20		3.100	295.00		2.800	276.70		2.760	278.00		2.700	264.00	
5.600	221.20		5.600	221.30		3.215	294.70		2.900	275.40		2.860	277.00		2.800	262.00	
5.800	219.30		5.800	219.40		3.330	294.40		3.000	274.10		2.960	276.00		2.900	260.00	
6.000	217.40		6.000	217.50		3.445	294.10		3.100	272.80		3.060	275.00		3.000	258.00	
6.200	215.50		6.200	215.60		3.560	293.80		3.200	271.50		3.160	274.00		3.100	256.00	
6.400	213.60		6.400	213.70		3.675	293.50		3.300	270.20		3.260	273.00		3.200	254.00	
6.600	211.70		6.600	211.80		3.790	293.20		3.400	268.90		3.360	272.00		3.300	252.00	
6.800	209.80		6.800	209.90		3.905	292.90		3.500	267.60		3.460	271.00		3.400	250.00	
7.000	207.90		7.000	208.00		4.020	292.60		3.600	266.30		3.560	270.00		3.500	248.00	
7.200	206.00		7.200	206.10		4.135	292.30		3.700	265.00		3.660	269.00		3.600	246.00	
7.400	204.10		7.400	204.20		4.250	292.00		3.800	263.70		3.760	268.00		3.700	244.00	
7.600	202.20		7.600	202.30		4.365	291.70		3.900	262.40		3.860	267.00		3.800	242.00	
7.800	200.30		7.800	200.40		4.480	291.40		4.000	261.10		3.960	266.00		3.900	240.00	
8.000	198.40		8.000	198.50		4.595	291.10		4.100	259.80		4.060	265.00		4.000	238.00	
8.200	196.50		8.200	196.60		4.710	290.80		4.200	258.50		4.160	264.00		4.100	236.00	
8.400	194.60		8.400	194.70		4.825	290.50		4.300	257.20		4.260	263.00		4.200	234.00	
8.600	192.70		8.600	192.80		4.940	290.20		4.400	255.90		4.360	262.00		4.300	232.00	
8.800	190.80		8.800	190.90		5.055	289.90		4.500	254.60		4.460	261.00		4.400	230.00	
9.000	188.90		9.000	189.00		5.170	289.60		4.600	253.30		4.560	260.00		4.500	228.00	
9.200	187.00		9.200	187.10		5.285	289.30		4.700	252.00		4.660	259.00		4.600	226.00	
9.400	185.10		9.400	185.20		5.400	289.00		4.800	250.70		4.760	258.00		4.700	224.00	
9.600	183.20		9.600	183.30		5.515	288.70		4.900	249.40		4.860	257.00		4.800	222.00	
9.800	181.30		9.800	181.40		5.630	288.40		5.000	248.10		4.960	256.00		4.900	220.00	
10.000	179.40		10.000	179.50		5.745	288.10		5.100	246.80		5.060	255.00		5.000	218.00	
10.200	177.50		10.200	177.60		5.860	287.80		5.200	245.50		5.160	254.00		5.100	216.00	
10.400	175.60		10.400	175.70		5.975	287.50		5.300	244.20		5.260	253.00		5.200	214.00	
10.600	173.70		10.600	173.80		6.090	287.20		5.400	242.90		5.360	252.00		5.300	212.00	
10.800	171.80		10.800	171.90		6.205	286.90		5.500	241.60		5.460	251.00		5.400	210.00	
11.000	169.90		11.000	170.00		6.320	286.60		5.600	240.30		5.560	250.00		5.500	208.00	
11.200	168.00		11.200	168.10		6.435	286.30		5.700	239.00		5.660	249.00		5.600	206.00	
11.400	166.10		11.400	166.20		6.550	286.00		5.800	237.70		5.760	248.00		5.700	204.00	
11.600	164.20		11.600	164.30		6.665	285.70		5.900	236.40		5.860	247.00		5.800	202.00	
11.800	162.30		11.800	162.40		6.780	285.40		6.000	235.10		5.960	246.00		5.900	200.00	
12.000	160.40		12.000	160.50		6.895	285.10		6.100	233.80		6.060	245.00		6.000	198.00	
12.200	158.50		12.200	158.60		7.010	284.80		6.200	232.50		6.160	244.00		6.100	196.00	
12.400	156.60		12.400	156.70		7.125	284.50		6.300	231.20		6.260	243.00		6.200	194.00	
12.600	154.70		12.600	154.80		7.240	284.20		6.400	229.90		6.360	242.00		6.300	192.00	
12.800	152.80		12.800	152.90		7.355	283.90		6.500	228.60		6.460	241.00		6.400	190.00	
13.000	150.90		13.000	151.00		7.470	283.60		6.600	227.30		6.560	240.00		6.500	188.00	
13.200	149.00		13.200	149.10		7.585	283.30		6.700	226.00		6.660	239.00		6.600	186.00	
13.400	147.10		13.400	147.20		7.700	283.00		6.800	224.70		6.760	238.00		6.700	184.00	
13.600	145.20		13.600	145.30		7.815	282.70		6.900	223.40		6.860	237.00		6.800	182.00	
13.800	143.30		13.800	143.40		7.930	282.40		7.000	222.10		6.960	236.00		6.900	180.00	
14.000	141.40		14.000	141.50		8.045	282.10		7.100	220.80		7.060	235.00		7.000	178.00	
14.200	139.50		14.200	139.60		8.160	281.80		7.200	219.50		7.160	234.00		7.100	176.00	
14.400	137.60		14.400	137.70		8.275	281.50		7.300	218.20		7.260	233.00		7.200	174.00	
14.600	135.70		14.600	135.80		8.390	281.20		7.400	216.90		7.360	232.00		7.300	172.00	
14.800	133.80		14.800	133.90		8.505	280.90		7.500	215.60		7.460	231.00		7.400	170.00	
15.000	131.90		15.000	132.00		8.620	280.60		7.600	214.30		7.560	230.00		7.500	168.00	
15.200	130.00		15.200	130.10		8.735	280.30		7.700	213.00		7.660	229.00		7.600	166.00	

D2218B			C2217A			D3222A			C3220B		
ML	EH		ML	EH		ML	EH		ML	EH	
0.000	300.70		0.000	301.20		0.000	301.30		0.000	301.40	
-0.026	300.60		-0.016	301.20		-0.024	301.30		-0.050	301.20	
-0.050	300.50		-0.045	301.10		-0.050	301.20		-0.100	300.90	
-0.072	300.40		-0.065	301.00		-0.100	301.10		-0.150	300.70	
-0.096	300.30		-0.091	300.90		-0.150	301.00		-0.200	300.50	
-0.115	299.85		-0.110	300.45		-0.200	301.00		-0.250	300.25	
-0.141	299.00		-0.134	299.60		-0.300	300.65		-0.304	300.00	
-0.166	298.20		-0.159	298.80		-0.400	300.20		-0.400	296.50	
-0.192	297.40		-0.185	298.00		-0.415	299.40		-0.400	291.50	
-0.219	296.50		-0.212	297.10		-0.500	298.40		-0.350	290.00	
-0.246	295.60		-0.239	296.20		-0.576	297.40		-0.300	288.00	
-0.273	294.70		-0.266	295.30		-0.650	296.40		-0.250	270.00	
-0.300	293.80		-0.293	294.40		-0.726	295.40		-0.200	250.00	
-0.326	292.90		-0.320	293.50		-0.800	294.40		-0.150	230.00	
-0.353	292.00		-0.347	292.60		-0.876	293.40		-0.100	210.00	
-0.379	291.10		-0.374	291.70		-0.950	292.40		-0.050	190.00	
-0.406	290.20		-0.401	290.80		-1.026	291.40		0.000	170.00	
-0.432	289.30		-0.427	289.90		-1.100	290.40		0.050	150.00	
-0.459	288.40		-0.454	289.00		-1.176	289.40		0.100	130.00	
-0.485	287.50		-0.480	288.10		-1.250	288.40		0.150	110.00	
-0.512	286.60		-0.507	287.20		-1.326	287.40		0.200	90.00	
-0.538	285.70		-0.533	286.30		-1.400	286.40		0.250	70.00	
-0.565	284.80		-0.560	285.40		-1.476	285.40		0.300	50.00	
-0.591	283.90		-0.586	284.50		-1.550	284.40		0.350	30.00	
-0.618	283.00		-0.613	283.60		-1.626	283.40		0.400	10.00	
-0.644	282.10		-0.639	282.70		-1.700	282.40		0.450	-10.00	
-0.671	281.20		-0.666	281.80		-1.776	281.40		0.500	-30.00	
-0.697	280.30		-0.692	280.90		-1.850	280.40		0.550	-50.00	
-0.724	279.40		-0.719	280.00		-1.926	279.40		0.600	-70.00	
-0.750	278.50		-0.745	279.10		-2.000	278.40		0.650	-90.00	
-0.777	277.60		-0.772	278.20		-2.076	277.40		0.700	-110.00	
-0.803	276.70		-0.798	277.30		-2.150	276.40		0.750	-130.00	
-0.830	275.80		-0.825	276.40		-2.226	275.40		0.800	-150.00	
-0.856	274.90		-0.851	275.50		-2.300	274.40		0.850	-170.00	
-0.883	274.00		-0.878	274.60		-2.376	273.40		0.900	-190.00	
-0.909	273.10		-0.904	273.70		-2.450	272.40		0.950	-210.00	
-0.936	272.20		-0.931	272.80		-2.526	271.40		1.000	-230.00	
-0.962	271.30		-0.957	271.90		-2.600	270.40		1.050	-250.00	
-0.989	270.40		-0.984	271.00		-2.676	269.40		1.100	-270.00	
-1.015	269.50		-1.010	270.10		-2.750	268.40		1.150	-290.00	
-1.042	268.60		-1.037	269.20		-2.826	267.40		1.200	-310.00	
-1.068	267.70		-1.063	268.30		-2.900	266.40		1.250	-330.00	
-1.095	266.80		-1.090	267.40		-2.976	265.40		1.300	-350.00	
-1.121	265.90		-1.116	266.50		-3.050	264.40		1.350	-370.00	
-1.148	265.00		-1.143	265.60		-3.126	263.40		1.400	-390.00	
-1.174	264.10		-1.169	264.70		-3.200	262.40		1.450	-410.00	
-1.201	263.20		-1.196	263.80		-3.276	261.40		1.500	-430.00	
-1.227	262.30		-1.222	262.90		-3.350	260.40		1.550	-450.00	
-1.254	261.40		-1.249	262.00		-3.426	259.40		1.600	-470.00	
-1.280	260.50		-1.275	261.10		-3.500	258.40		1.650	-490.00	
-1.307	259.60		-1.302	260.20		-3.576	257.40		1.700	-510.00	
-1.333	258.70		-1.328	259.30		-3.650	256.40		1.750	-530.00	
-1.360	257.80		-1.355	258.40		-3.726	255.40		1.800	-550.00	
-1.386	256.90		-1.381	257.50		-3.800	254.40		1.850	-570.00	
-1.413	256.00		-1.408	256.60		-3.876	253.40		1.900	-590.00	
-1.439	255.10		-1.434	255.70		-3.950	252.40		1.950	-610.00	
-1.466	254.20		-1.461	254.80		-4.026	251.40		2.000	-630.00	
-1.492	253.30		-1.487	253.90		-4.100	250.40		2.050	-650.00	
-1.519	252.40		-1.514	253.00		-4.176	249.40		2.100	-670.00	
-1.545	251.50		-1.540	252.10		-4.250	248.40		2.150	-690.00	
-1.572	250.60		-1.567	251.20		-4.326	247.40		2.200	-710.00	
-1.598	249.70		-1.593	250.30		-4.400	246.40		2.250	-730.00	
-1.625	248.80		-1.620	249.40		-4.476	245.40		2.300	-750.00	
-1.651	247.90		-1.646	248.50		-4.550	244.40		2.350	-770.00	
-1.678	247.00		-1.673	247.60		-4.626	243.40		2.400	-790.00	
-1.704	246.10		-1.700	246.70		-4.700	242.40		2.450	-810.00	
-1.731	245.20		-1.727	245.80		-4.776	241.40		2.500	-830.00	
-1.757	244.30		-1.753	244.90		-4.850	240.40		2.550	-850.00	
-1.784	243.40		-1.780	244.00		-4.926	239.40		2.600	-870.00	
-1.810	242.50		-1.806	243.10		-5.000	238.40		2.650	-890.00	
-1.837	241.60		-1.833	242.20		-5.076	237.40		2.700	-910.00	
-1.863	240.70		-1.859	241.30		-5.150	236.40		2.750	-930.00	
-1.890	239.80		-1.886	240.40		-5.226	235.40		2.800	-950.00	
-1.916	238.90		-1.912	239.50		-5.300	234.40		2.850	-970.00	
-1.943	238.00		-1.939	238.60		-5.376	233.40		2.900	-990.00	
-1.969	237.10		-1.965	237.70		-5.450	232.40		2.950	-1010.00	
-1.996	236.20		-1.992	236.80		-5.526	231.40		3.000	-1030.00	
-2.022	235.30		-2.018	235.90		-5.600	230.40		3.050	-1050.00	
-2.049	234.40		-2.045	235.00		-5.676	229.40		3.100	-1070.00	
-2.075	233.50		-2.071	234.10		-5.750	228.40		3.150	-1090.00	
-2.102	232.60		-2.098	233.20		-5.826	227.40		3.200	-1110.00	
-2.128	231.70		-2.124	232.30		-5.900	226.40		3.250	-1130.00	
-2.155	230.80		-2.151	231.40		-5.976	225.40		3.300	-1150.00	
-2.181	229.90		-2.177	230.50		-6.050	224.40		3.350	-1170.00	
-2.208	229.00		-2.204	229.60		-6.126	223.40		3.400	-1190.00	
-2.234	228.10		-2.230	228.70		-6.200	222.40		3.450	-1210.00	
-2.261	227.20		-2.257	227.80		-6.276	221.40		3.500	-1230.00	
-2.287	226.30		-2.283	226.90		-6.350	220.40		3.550	-1250.00	
-2.314	225.40		-2.310	226.00		-6.426	219.40		3.600	-1270.00	
-2.340	224.50		-2.336	225.10		-6.500	218.40		3.650	-1290.00	
-2.367	223.60		-2.363	224.20		-6.576	217.40		3.700	-1310.00	
-2.393	222.70		-2.389	223.30		-6.650	216.40		3.750	-1330.00	
-2.420	221.80		-2.416	222.40		-6.726	215.40		3.800	-1350.00	
-2.446	220.90		-2.442	221.50		-6.800	214.40		3.850	-1370.00	
-2.473	220.00		-2.469	220.60		-6.876	213.40		3.900	-1390.00	
-2.499	219.10		-2.495	219.70		-6.950	212.40		3.950	-1410.00	
-2.526	218.20		-2.522	218.80		-7.026	211.40		4.000	-1430.00	
-2.552	217.30		-2.548	217.90		-7.100	210.40		4.050	-1450.00	
-2.579	216.40		-2.575	217.00		-7.176	209.40		4.100	-1470.00	
-2.605	215.50		-2.601	216.10		-7.250	208.40		4.150	-1490.00	
-2.632	214.60		-2.628	215.20		-7.326	207.40		4.200	-1510.00	
-2.658	213.70		-2.654	214.30		-7.400	206.40		4.250	-1530.00	
-2.685	212.80		-2.681	213.40		-7.476	205.40		4.300	-1550.00	
-2.711	211.90		-2.707	212.50		-7.550	204.40		4.350	-1570.00	
-2.738	211.00		-2.734	211.60		-7.626	203.40		4.400	-1590.00	
-2.764	210.10		-2.760	210.70		-7.700	202.40		4.450	-1610.00	
-2.791	209.20		-2.787	209.80		-7.776	201.40		4.500	-1630.00	
-2.817	208.30		-2.813	208.90		-7.850	200.40		4.550	-1650.00	
-2.844	207.40		-2.840	208.00		-7.926	199.40		4.600	-1670.00	
-2.870	206.50		-2.866	207.10		-8.000	198.40		4.650	-1690.00	
-2.897	205.60		-2.893	206.20		-8.076	197.40		4.700	-1710.00	
-2.923	204.70		-2.919	205.30		-8.150	196.40		4.750	-1730.00	
-2.950	203.80		-2.946	204.40		-8.226	195.40		4.800	-1750.00	
-2.976	202.90		-2.972	203.50		-8.300	194.40		4.850	-	

S0313A			T0313A			S0296A			T0296A			S1299B			T1299B		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	309.80		0.000	309.80		0.000	310.60		0.000	310.70		0.000	310.85		0.000	310.80	
.732	300.00		.705	300.00		1.704	290.60		.009	310.60		.008	310.80		1.156	299.95	
1.293	289.90		1.242	289.90		2.240	290.50		.976	300.50		.017	310.75		1.924	290.10	
1.697	280.00		1.626	279.90		2.615	270.60		1.680	290.55		1.200	299.95		2.494	280.00	
1.990	270.00		1.899	270.00		2.881	260.60		2.190	280.50		2.000	290.10		2.892	270.10	
2.197	260.00		2.100	259.40		3.072	250.50		2.556	270.60		2.598	280.00		3.176	260.00	
2.346	250.00		2.227	250.00		3.204	240.60		2.810	260.60		3.024	270.10		3.371	250.15	
2.523	230.10		2.319	239.90		3.368	230.50		2.990	250.30		3.329	260.10		3.508	240.10	
2.580	219.20		2.432	219.20		3.420	220.60		3.110	240.50		3.546	250.10		3.694	230.10	
2.618	210.10		2.459	210.10		3.584	210.80		3.194	230.50		3.700	240.05		3.669	220.30	
2.654	200.10		2.481	200.10		3.600	132.40		3.254	220.60		3.810	230.20		3.714	210.40	
2.683	190.20		2.496	189.70		3.615	118.60		3.291	210.75		3.895	220.30		3.748	200.40	
2.712	180.30		2.506	180.20		3.642	89.00		3.318	201.80		3.961	210.40		3.772	190.00	
2.742	171.30		2.516	169.85		3.676	48.00		3.341	191.30		4.017	200.40		3.787	180.80	
2.778	156.10		2.526	154.40		3.690	34.20		3.355	180.15		4.061	190.60		3.796	173.90	
2.802	143.80		2.536	127.50		3.710	14.90		3.364	170.10		4.100	181.10		3.806	162.90	
2.828	130.40		2.546	65.70		3.730	2.40		3.374	150.00		4.140	171.10		3.818	145.30	
2.850	115.60		2.556	-44.90		3.750	-16.90		3.384	96.60		4.170	161.70		3.830	116.20	
2.870	100.20		2.566	-84.80		3.770	-30.30		3.394	-17.20		4.203	150.50		3.840	79.10	
2.886	87.20		2.576	-104.00		3.790	-44.80		3.404	-64.60		4.232	140.50		3.850	19.90	
2.902	71.10		2.586	-115.10		3.800	-56.60		3.414	-88.40		4.260	125.60		3.860	-29.90	
2.920	55.20		2.600	-127.20		3.830	-67.80		3.430	-107.00		4.280	112.60		3.870	-45.70	
2.936	41.90		2.626	-142.30		3.870	-79.90		3.450	-122.90		4.312	91.10		3.880	-56.70	
2.960	14.20		2.660	-158.60		3.930	-92.30		3.480	-140.60		4.330	78.20		3.890	-65.10	
2.980	-5.20		2.720	-176.20		4.000	-102.50		3.536	-160.10		4.345	67.20		3.916	-79.90	
3.000	-19.70		2.834	-194.25		4.080	-115.30		3.560	-180.80		4.362	54.80		3.950	-92.40	
3.020	-29.70		2.978	-207.30		4.200	-133.10		3.760	-194.20		4.380	44.50		4.000	-106.20	
3.050	-41.40		3.174	-218.10		4.400	-149.00		3.980	-208.30		4.400	33.70		4.062	-119.80	
3.100	-56.80		3.388	-226.10		4.800	-163.60		4.290	-220.20		4.430	19.90		4.136	-133.40	
3.170	-71.50		3.620	-232.50		5.100	-181.30		4.720	-230.40		4.460	4.20		4.250	-153.00	
3.270	-87.50		6.000	-259.80		5.400	-194.80		5.420	-240.90		4.490	-11.70		4.330	-165.20	
3.400	-102.90					5.800	-208.10		5.590	-242.80		4.520	-23.50		4.450	-180.10	
3.550	-116.30					6.300	-220.10		8.000	-259.30		4.560	-39.70		4.600	-193.20	
3.730	-129.50					6.900	-230.40					4.600	-52.50		4.820	-205.50	
3.960	-144.20					7.800	-240.90					4.650	-63.40		5.100	-215.90	
4.200	-157.60					8.000	-242.80					4.750	-80.40		5.670	-228.90	
4.500	-176.10											4.850	-92.00		6.000	-234.00	
4.800	-194.00											5.000	-105.60		8.000	-251.40	
5.100	-207.30											5.200	-120.10		9.500	-258.60	
5.400	-218.10											5.450	-134.70				
5.700	-226.20											5.800	-153.30				
6.000	-232.45											6.100	-167.10				
												6.400	-180.40				
												6.750	-193.60				
												7.200	-206.30				
												7.700	-216.20				
												8.500	-228.70				

S2303A

ML	EH
0.000	310.70
1.110	300.00
1.872	290.00
2.427	280.00
2.824	270.00
3.102	260.00
3.297	250.00
3.435	240.00
3.531	230.00
3.597	220.00
3.647	210.00
3.681	199.90
3.706	189.90
3.725	180.00
3.742	169.70
3.754	158.50
3.764	146.70
3.774	134.00
3.784	111.30
3.794	75.40
3.804	20.00
3.814	-38.60
3.824	-71.30
3.836	-95.50
3.850	-113.70
3.865	-127.50
3.882	-138.40
3.910	-151.80
3.950	-163.70
4.000	-174.10
4.080	-185.50
4.190	-195.60
4.352	-205.55
4.587	-215.50
4.950	-225.50
5.508	-235.50
6.000	-241.65

T2303A

ML	EH
0.000	310.70
1.094	300.00
1.846	290.00
2.390	280.00
2.776	270.00
3.048	260.00
3.237	250.00
3.365	240.00
3.455	230.00
3.515	220.00
3.558	210.00
3.588	199.80
3.607	189.90
3.622	180.20
3.634	169.70
3.644	156.30
3.654	130.00
3.664	53.10
3.674	-60.10
3.684	-90.80
3.694	-105.80
3.704	-117.40
3.714	-125.80
3.734	-138.35
3.764	-151.80
3.803	-163.70
3.854	-174.15
3.934	-185.50
4.047	-195.60
4.206	-205.60
4.450	-215.60
4.812	-225.50
5.384	-235.50
5.884	-241.60
6.000	-242.70

S3306B

ML	EH
0.000	311.50
1.020	300.90
1.720	291.00
2.240	281.00
2.607	271.00
2.870	261.00
3.068	250.00
3.192	240.00
3.280	230.00
3.343	220.00
3.387	210.00
3.419	200.00
3.445	189.90
3.462	180.00
3.476	170.90
3.486	161.00
3.496	150.40
3.506	135.00
3.514	117.90
3.522	95.60
3.530	65.80
3.540	23.40
3.550	-29.40
3.560	-67.60
3.570	-86.10
3.580	-100.60
3.590	-111.30
3.604	-123.20
3.620	-134.50
3.640	-143.90
3.670	-155.80
3.710	-167.00
3.770	-178.20
3.850	-188.60
3.970	-199.00
4.165	-210.00
4.434	-220.00
4.842	-230.00
5.478	-240.00
6.000	-245.75

T3306B

ML	EH
0.000	311.50
1.008	300.90
1.702	291.00
2.217	281.00
2.580	271.00
2.838	261.00
3.031	250.00
3.150	240.00
3.233	230.00
3.289	220.00
3.330	210.00
3.358	200.00
3.380	188.25
3.396	175.30
3.410	154.80
3.420	129.30
3.430	69.50
3.440	-35.00
3.450	-76.80
3.460	-95.00
3.470	-106.30
3.480	-115.00
3.491	-123.10
3.508	-134.10
3.528	-143.60
3.560	-155.80
3.601	-167.00
3.661	-178.20
3.743	-188.60
3.861	-199.00
4.060	-210.00
4.331	-220.00
4.745	-230.00
5.391	-240.00
5.935	-245.70
6.000	-246.20

CC0362B			DD0362B			CC0366A			CC4364B			DD4364B		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	301.75		0.000	301.80		0.000	300.80		0.000	300.80		0.000	300.80	
2.000	293.60		2.000	295.80		1.050	300.60		.900	289.70		.040	300.50	
4.000	283.10		4.000	288.70		1.700	290.70		1.500	280.10		1.200	290.00	
5.700	276.40		5.300	283.00		3.000	280.40		2.000	268.80		2.000	280.10	
6.800	258.00		6.000	279.60		3.900	270.55		2.400	255.10		2.600	269.80	
7.600	243.60		7.500	270.50		4.600	259.90		2.700	238.30		3.200	253.90	
8.000	232.60		8.900	258.40		5.100	248.75		2.840	225.30		3.530	238.15	
8.400	211.30		10.000	242.90		5.360	240.40		2.930	212.20		3.690	225.40	
8.520	200.30		10.500	231.20		5.590	230.40		2.950	208.00		3.790	212.80	
8.600	189.50		10.970	211.80		5.740	220.60		3.000	197.20		3.840	202.50	
8.650	179.40		11.100	202.70		5.860	209.40		3.034	186.00		3.890	188.00	
8.690	169.40		11.220	189.60		5.940	198.40		3.060	173.50		3.920	171.40	
8.720	158.40		11.280	179.60		5.990	189.00		3.085	160.50		3.940	151.80	
8.740	149.10		11.330	166.50		6.026	179.70		3.105	144.95		3.960	129.20	
8.760	138.10		11.360	153.80		6.054	169.30		3.120	129.50		3.970	118.80	
8.780	128.50		11.390	134.50		6.080	155.80		3.135	109.30		3.980	106.70	
8.810	113.50		11.410	106.70		6.096	144.90		3.145	90.80		3.990	87.30	
8.835	103.10		11.420	89.10		6.112	133.60		3.155	71.40		4.000	52.30	
8.860	93.40		11.430	72.10		6.122	126.20		3.165	55.20		4.010	22.80	
8.900	82.40		11.440	57.70		6.136	116.15		3.180	33.60		4.020	8.40	
8.940	73.10		11.450	38.90		6.150	107.00		3.195	17.40		4.040	-8.70	
9.000	60.70		11.460	24.00		6.166	97.20		3.215	0.00		4.060	-19.60	
9.050	49.10		11.480	-5.30		6.184	90.30		3.240	-13.50		4.100	-33.60	
9.150	27.00		11.500	-29.00		6.212	78.50		3.280	-26.80		4.180	-49.20	
9.250	-4.00		11.520	-39.00		6.238	69.90		3.340	-40.30		4.300	-63.50	
9.350	-46.90		11.560	-56.20		6.266	61.00		3.450	-55.90		4.500	-83.10	
9.400	-60.90		11.610	-70.30		6.290	52.00		3.650	-72.00		5.100	-101.90	
9.480	-74.90		11.680	-86.40		6.330	41.50		4.000	-88.85		5.750	-118.40	
9.580	-84.40		11.780	-104.40		6.370	28.00		4.500	-104.40		6.500	-133.60	
9.700	-93.40		11.900	-122.30		6.410	12.50		5.100	-118.00		7.000	-143.00	
9.830	-103.60		12.000	-134.90		6.440	-4.30		5.800	-131.60		7.700	-157.00	
10.000	-118.10		12.200	-154.90		6.470	-24.20		6.500	-144.40		8.000	-163.20	
			12.500	-168.30		6.510	-48.10		7.200	-158.30		8.700	-181.70	
			12.900	-174.60		6.560	-66.70							
			13.150	-175.90		6.600	-75.30							
			13.500	-177.30		6.680	-86.20							
			14.000	-178.70		6.780	-96.20							
						6.900	-109.60							
						7.100	-130.00							
						7.300	-162.40							
						7.400	-169.50							
						7.600	-174.10							
						8.000	-177.50							

P2320A			W2320A			P2338B			W2338B			P3322A			W3322A		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	298.80		0.000	298.80		0.000	299.40		0.000	299.40		0.000	297.00		0.000	297.00	
.736	290.00		.728	290.00		.044	299.00		.040	298.90		.596	290.00		.592	289.90	
1.377	280.00		1.359	280.00		.784	290.00		.758	290.00		1.264	279.90		1.248	279.90	
1.848	269.90		1.821	269.90		1.408	279.90		1.366	279.95		1.749	270.00		1.723	270.00	
2.178	260.00		2.150	260.00		1.856	270.00		1.806	269.90		2.101	260.00		2.080	259.50	
2.416	250.00		2.380	250.00		2.180	260.00		2.116	260.00		2.352	249.95		2.314	249.85	
2.580	240.10		2.544	239.85		2.420	249.40		2.338	250.00		2.530	239.90		2.480	240.00	
2.700	230.00		2.654	229.80		2.570	240.00		2.490	239.90		2.660	239.40		2.598	229.90	
2.783	220.00		2.730	219.95		2.683	230.00		2.595	229.90		2.745	219.90		2.679	219.90	
2.850	208.70		2.790	207.70		2.770	219.20		2.670	219.60		2.810	209.55		2.737	210.00	
2.886	199.90		2.820	199.30		2.864	199.95		2.754	199.60		2.856	200.00		2.780	198.15	
2.932	185.30		2.854	183.85		2.896	189.70		2.776	190.05		2.893	189.60		2.802	189.50	
2.960	170.50		2.870	171.40		2.919	180.00		2.793	180.10		2.920	179.95		2.820	180.70	
2.982	155.20		2.882	156.00		2.944	166.90		2.806	168.90		2.943	169.80		2.834	171.20	
3.000	138.80		2.892	135.40		2.964	151.70		2.818	154.70		2.959	159.80		2.846	158.10	
3.011	126.10		2.900	101.00		2.978	136.60		2.828	135.00		2.973	150.20		2.856	142.00	
3.020	112.70		2.906	59.50		2.990	120.90		2.836	104.60		2.984	141.30		2.862	124.60	
3.030	92.90		2.912	-3.40		3.000	102.70		2.842	65.70		2.996	129.60		2.866	111.40	
3.040	58.70		2.918	-57.70		3.008	82.70		2.848	65.70		3.006	118.80		2.870	80.50	
3.050	12.20		2.924	-96.70		3.014	63.80		2.854	-52.80		3.016	104.50		2.875	45.30	
3.060	-55.50		2.931	-117.00		3.020	44.00		2.860	-92.40		3.024	90.70		2.880	-7.70	
3.070	-102.00		2.940	-132.30		3.028	17.00		2.866	-110.30		3.032	73.30		2.885	-50.80	
3.080	-120.10		2.950	-144.40		3.036	-27.20		2.872	-120.80		3.040	50.50		2.890	-84.10	
3.090	-131.50		2.966	-156.70		3.044	-72.20		2.882	-134.10		3.048	19.00		2.895	-102.40	
3.105	-145.20		3.005	-174.90		3.052	-98.70		2.896	-146.80		3.054	-10.20		2.900	-114.30	
3.130	-160.05		3.060	-189.60		3.062	-115.30		2.918	-160.00		3.062	-54.30		2.910	-129.50	
3.166	-175.70		3.150	-203.70		3.074	-128.10		2.944	-170.20		3.072	-88.40		2.920	-138.10	
3.226	-190.30		3.340	-220.10		3.090	-141.00		2.980	-181.40		3.082	-117.30		2.938	-151.50	
3.326	-204.80		3.668	-235.10		3.110	-153.30		3.050	-195.00		3.092	-131.10		2.970	-169.20	
3.510	-220.00		3.813	-239.50		3.140	-165.30		3.170	-209.00		3.102	-141.10		3.010	-183.00	
3.850	-235.10		4.000	-244.20		3.200	-182.90		3.370	-222.70		3.120	-153.60		3.058	-193.30	
4.000	-239.50					3.266	-194.50		3.560	-230.90		3.150	-169.40		3.126	-203.40	
						3.400	-209.20		3.720	-236.10		3.190	-182.80		3.226	-213.70	
						3.600	-222.20		3.800	-238.00		3.240	-193.15		3.376	-223.90	
						3.800	-230.70		4.000	-242.70		3.310	-203.80		3.606	-234.10	
						4.000	-236.80					3.410	-213.75		3.816	-240.65	
												3.560	-223.90		4.000	-245.10	
												3.790	-234.10				
												4.000	-240.65				

JJ1383B			JJ1407A			JJ2386A			JJ2405A			JJ3387A			JJ3405A		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	297.20		0.000	298.20		0.000	299.50		0.000	297.00		0.000	298.70		0.000	297.00	
.100	296.10		.100	297.10		.100	298.40		.100	295.90		.100	297.60		.100	295.90	
.630	289.90		.670	290.10		.700	291.20		.600	290.00		.700	290.30		.600	290.00	
1.300	279.80		1.300	280.30		1.400	280.20		1.300	279.40		1.350	280.20		1.300	279.50	
1.800	269.55		1.770	270.25		1.850	270.40		1.750	270.10		1.820	270.10		1.800	269.00	
2.200	257.70		2.130	259.55		2.180	260.30		2.150	258.60		2.150	260.20		2.160	258.20	
2.400	249.40		2.360	249.60		2.430	249.50		2.370	249.40		2.390	250.10		2.370	249.35	
2.570	240.00		2.530	239.65		2.600	238.85		2.540	239.60		2.550	240.60		2.550	238.80	
2.710	229.10		2.650	229.60		2.700	229.90		2.660	229.60		2.680	229.70		2.700	225.60	
2.800	219.50		2.746	218.80		2.790	218.90		2.750	219.20		2.770	218.90		2.800	212.00	
2.880	208.10		2.806	209.80		2.840	210.40		2.810	209.40		2.820	210.50		2.870	196.70	
2.930	198.50		2.870	197.25		2.920	189.00		2.860	197.70		2.870	199.50		2.920	180.30	
2.970	189.90		2.944	189.35		2.944	179.65		2.900	184.95		2.900	190.30		2.950	165.10	
3.010	179.80		2.944	178.80		2.964	169.25		2.920	175.70		2.930	179.30		2.970	152.90	
3.050	169.50		2.980	169.60		2.980	159.20		2.950	164.50		2.950	169.20		2.990	137.00	
3.100	157.20		3.020	159.30		2.992	150.20		2.958	150.65		2.964	160.60		3.010	108.90	
3.130	149.75		3.060	149.50		3.002	140.30		2.974	134.10		2.980	149.50		3.020	90.00	
3.170	141.20		3.100	141.00		3.010	129.20		2.984	120.80		2.994	138.00		3.030	55.90	
3.210	134.70		3.150	132.00		3.020	116.40		2.992	105.20		3.004	124.70		3.040	2.00	
3.260	124.50		3.210	118.30		3.030	95.50		2.998	88.80		3.012	113.80		3.044	-33.50	
3.310	112.30		3.250	106.80		3.036	82.80		3.002	74.10		3.020	98.60		3.048	-59.40	
3.360	93.90		3.290	88.70		3.042	65.40		3.006	53.40		3.026	86.00		3.054	-89.00	
3.380	84.00		3.310	75.00		3.048	46.80		3.010	32.65		3.032	67.80		3.060	-105.00	
3.400	72.10		3.330	63.40		3.056	11.70		3.016	-3.40		3.038	44.20		3.068	-119.00	
3.420	59.30		3.350	50.00		3.064	-33.20		3.022	-48.00		3.044	0.00		3.078	-131.70	
3.440	47.80		3.380	30.80		3.074	-74.50		3.028	-79.60		3.050	-47.20		3.090	-142.90	
3.460	34.40		3.420	6.40		3.084	-97.30		3.034	-98.60		3.056	-102.90		3.110	-158.60	
3.480	23.90		3.460	-29.70		3.100	-119.00		3.040	-111.20		3.064	-102.90		3.140	-172.80	
3.500	6.20		3.500	-54.60		3.120	-138.20		3.048	-125.90		3.072	-118.00		3.180	-184.50	
3.520	-11.60					3.150	-155.80		3.058	-138.50		3.082	-132.10		3.240	-196.30	
3.540	-10.70					3.190	-171.20		3.070	-148.70		3.100	-150.70		3.320	-206.80	
3.550	-30.80					3.250	-185.90		3.086	-158.50		3.130	-167.40		3.420	-215.75	
3.570	-58.10					3.330	-198.30		3.110	-170.60		3.166	-180.00		3.600	-226.55	
3.600	-84.70					3.430	-207.60		3.140	-180.60		3.240	-195.40				
3.650	-109.80					3.550	-215.30		3.200	-193.90		3.370	-210.70				
3.700	-126.60					3.700	-223.40		3.350	-212.30		3.600	-225.60				
3.800	-153.70					4.000	-234.90		3.500	-222.70		3.800	-233.60				
4.000	-192.20								3.650	-230.00		4.000	-239.60				

NN1396A			NN1413A			NN2395A			NN2412A			NN3395A			NN3412A		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	298.70		0.000	296.25		0.000	298.80		0.000	297.00		0.000	298.40		0.000	297.60	
.100	297.70		.100	295.15		.100	297.70		.100	295.85		.100	297.35		.102	296.45	
.600	290.55		.600	289.20		.700	290.30		.600	289.80		.700	289.90		.600	290.50	
1.400	279.80		1.200	280.45		1.300	280.40		1.240	280.10		1.300	280.50		1.300	280.00	
1.850	270.35		1.700	270.70		1.800	270.20		1.720	270.20		1.800	269.60		1.770	270.20	
2.200	260.20		2.100	259.90		2.130	260.20		2.100	259.30		2.100	260.50		2.150	259.20	
2.450	250.00		2.400	248.15		2.360	250.30		2.320	250.20		2.350	249.85		2.370	250.10	
2.630	239.85		2.550	239.90		2.530	240.00		2.500	239.80		2.500	240.80		2.550	239.60	
2.750	230.40		2.700	228.80		2.650	229.70		2.620	230.30		2.620	230.85		2.666	230.30	
2.850	219.70		2.800	218.40		2.730	220.30		2.720	219.00		2.710	220.20		2.760	219.30	
2.920	209.40		2.860	209.60		2.790	210.80		2.800	205.70		2.770	210.10		2.820	209.65	
3.000	192.50		2.900	203.10		2.840	199.90		2.860	189.90		2.814	200.40		2.870	198.90	
3.044	179.40		2.950	191.20		2.874	189.80		2.890	180.40		2.846	190.45		2.906	188.10	
3.070	169.55		2.990	180.80		2.900	180.40		2.910	171.20		2.872	180.40		2.930	177.40	
3.092	160.10		3.020	169.50		2.922	170.10		2.926	162.60		2.900	166.00		2.946	169.90	
3.112	149.20		3.044	159.30		2.940	159.70		2.940	154.40		2.920	152.50		2.964	159.10	
3.130	138.80		3.060	151.00		2.954	149.40		2.954	143.10		2.934	140.30		2.980	148.20	
3.142	130.80		3.080	140.70		2.966	139.70		2.970	129.30		2.944	128.90		2.990	139.50	
3.154	119.70		3.100	127.20		2.976	130.10		2.982	117.30		2.952	116.95		3.000	127.60	
3.164	111.10		3.116	111.70		2.986	119.00		2.990	105.60		2.960	100.60		3.010	112.90	
3.174	99.40		3.130	96.20		2.996	104.10		2.996	94.60		2.966	86.10		3.016	100.40	
3.184	86.90		3.140	82.60		3.004	85.00		3.000	86.90		2.970	74.00		3.022	86.80	
3.200	62.30		3.148	69.40		3.010	66.50		3.006	67.40		2.976	46.70		3.028	64.40	
3.214	44.90		3.154	60.00		3.016	45.10		3.010	51.50		2.982	12.90		3.034	34.40	
3.228	30.00		3.162	50.70		3.022	17.20		3.014	34.00		2.988	-28.60		3.040	1.90	
3.240	3.20		3.174	39.30		3.028	-16.60		3.018	17.00		2.994	-61.40		3.044	-17.00	
3.250	-27.40		3.188	22.50		3.034	-52.20		3.022	-		3.000	-84.20		3.050	-48.00	
3.260	-44.90		3.204	-24.30		3.040	-77.70		3.028	-35.30		3.006	-99.60		3.060	-80.20	
3.274	-59.60		3.216	-47.80		3.046	-96.20		3.034	-66.40		3.012	-110.70		3.070	-95.80	
3.290	-70.30		3.230	-62.00		3.052	-108.10		3.040	-81.50		3.020	-122.40		3.090	-118.60	
3.316	-83.60		3.254	-78.00		3.060	-119.80		3.048	-102.40		3.030	-132.90		3.110	-133.20	
3.360	-98.30		3.290	-91.75		3.074	-135.50		3.056	-115.40		3.050	-149.90		3.140	-150.80	
3.460	-119.40		3.350	-108.70		3.090	-147.40		3.066	-126.60		3.076	-164.40		3.180	-166.60	
3.700	-153.40		3.430	-123.70		3.110	-160.10		3.078	-136.70		3.110	-176.90		3.230	-181.00	
3.830	-170.70		3.530	-138.50		3.140	-172.60		3.094	-148.80		3.160	-189.25		3.290	-192.20	
4.000	-191.70		3.650	-154.40		3.190	-186.20		3.110	-159.10		3.250	-202.90		3.370	-203.10	
4.200	-210.30		3.800	-173.70		3.260	-198.50		3.130	-168.20		3.400	-216.35		3.600	-227.50	
4.400	-222.40		4.000	-198.20		3.360	-209.60		3.180	-183.60		3.600	-235.00		4.000	-240.70	
			4.100	-207.30		3.500	-219.90		3.242	-196.20		3.800	-250.00				
			4.250	-218.00		4.000	-239.35		3.420	-215.00		4.000	-240.70				

001413A			001423A			002414A			002420A			003414A			003420A		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	296.20		0.000	296.50		0.000	295.90		0.000	298.00		0.000	295.70		0.000	297.90	
.100	295.10		.100	295.40		.100	294.80		.100	296.90		.100	294.60		.100	296.80	
.600	289.20		.600	289.50		.600	288.80		.650	290.20		.600	288.70		.650	290.20	
1.220	280.15		1.230	280.30		1.200	279.90		1.300	280.00		1.200	279.90		1.300	280.20	
1.720	270.50		1.760	269.85		1.700	270.00		1.800	269.10		1.700	270.10		1.800	269.80	
2.100	260.55		2.150	259.15		2.060	260.20		2.100	260.05		2.070	260.30		2.150	259.70	
2.380	250.40		2.380	250.40		2.320	250.20		2.350	249.60		2.350	250.00		2.380	250.40	
2.580	240.50		2.600	239.00		2.510	240.10		2.550	237.30		2.550	239.60		2.560	240.50	
2.720	230.95		2.720	230.80		2.644	230.10		2.720	228.60		2.700	228.80		2.700	229.90	
2.840	219.90		2.840	219.95		2.750	219.00		2.720	220.70		2.800	219.10		2.800	219.60	
2.920	210.20		2.920	210.20		2.830	207.60		2.790	210.40		2.870	210.10		2.870	210.10	
2.990	199.90		2.990	199.60		2.874	199.40		2.844	199.90		2.930	199.60		2.930	199.60	
3.042	189.50		3.040	190.20		2.914	189.60		2.884	189.70		2.980	190.50		2.974	190.10	
3.086	179.90		3.084	180.10		2.950	179.10		2.914	180.00		3.020	180.30		3.010	180.40	
3.120	170.20		3.120	170.60		2.980	169.00		2.940	170.80		3.054	170.00		3.054	166.60	
3.156	158.80		3.154	160.20		3.000	160.90		2.960	161.95		3.086	159.90		3.100	148.30	
3.182	150.30		3.184	149.50		3.020	150.90		2.980	152.30		3.110	149.50		3.120	138.00	
3.208	139.35		3.210	138.55		3.040	140.60		3.000	140.40		3.130	139.90		3.140	127.20	
3.230	128.00		3.230	129.55		3.060	127.70		3.015	130.50		3.150	129.40		3.160	112.70	
3.246	119.60		3.250	119.00		3.080	112.60		3.026	122.10		3.170	117.25		3.170	104.30	
3.260	110.80		3.270	106.30		3.100	89.20		3.040	109.30		3.188	103.90		3.180	94.50	
3.280	96.70		3.280	98.80		3.114	59.00		3.050	96.30		3.200	91.50		3.190	82.90	
3.300	76.60		3.290	90.00		3.122	38.00		3.058	83.60		3.210	77.30		3.200	66.20	
3.316	53.20		3.300	80.30		3.130	9.30		3.064	72.00		3.220	62.40		3.210	46.90	
3.330	28.20		3.310	68.10		3.138	-20.10		3.070	55.10		3.230	44.20		3.218	29.00	
3.340	12.90		3.320	54.60		3.146	-52.00		3.074	41.50		3.240	26.60		3.226	11.70	
3.350	-7.00		3.330	40.10		3.154	-71.80		3.078	27.40		3.250	5.90		3.234	-5.80	
3.370	-34.50		3.340	26.20		3.162	-84.30		3.084	-1.60		3.260	-15.40		3.242	-21.90	
3.390	-52.90		3.350	11.70		3.174	-98.80		3.090	-28.20		3.270	-32.70		3.250	-39.70	
3.420	-74.10		3.362	-6.50		3.190	-113.50		3.096	-53.90		3.280	-47.70		3.260	-56.20	
3.450	-86.50		3.380	-26.70		3.210	-128.70		3.102	-71.70		3.290	-60.00		3.280	-79.70	
3.500	-101.20		3.400	-44.60		3.240	-144.80		3.110	-89.30		3.310	-80.50		3.300	-96.40	
3.570	-116.50		3.430	-62.00		3.280	-160.40		3.120	-105.80		3.335	-96.00		3.330	-115.40	
3.650	-130.00		3.480	-78.70		3.330	-177.50		3.130	-118.00		3.370	-110.50		3.360	-128.80	
3.760	-145.60		3.560	-96.00		3.390	-190.40		3.150	-135.90		3.430	-130.30		3.400	-143.50	
3.880	-161.50		3.680	-112.80		3.460	-201.10		3.170	-148.70		3.500	-147.90		3.450	-159.90	
4.000	-177.30		3.800	-125.30		3.550	-210.30		3.200	-163.70		3.580	-166.50		3.530	-180.60	
4.130	-193.60		4.000	-142.90		3.650	-218.00		3.240	-176.70		3.660	-182.90		3.610	-194.50	
4.270	-208.00		4.500	-186.30					3.290	-187.60		3.750	-196.90		3.700	-205.20	
4.400	-217.20		4.720	-205.00					3.350	-197.80		3.870	-209.80		3.850	-217.50	
4.550	-225.60								3.430	-207.10		4.000	-219.30				
									3.550	-217.00							
									3.700	-225.50							

T1311A

ML	EH
0.000	309.90
.804	300.00
1.410	290.00
1.850	280.00
2.164	269.95
2.385	260.00
2.541	250.00
2.649	239.95
2.725	229.85
2.777	219.90
2.814	209.90
2.843	199.90
2.864	188.60
2.874	180.90
2.884	170.70
2.894	158.50
2.904	137.00
2.914	98.40
2.924	49.70
2.934	-11.10
2.944	-49.70
2.954	-64.60
2.964	-75.90
2.984	-89.50
3.010	-101.30
3.050	-114.80
3.110	-131.90
3.170	-146.80
3.230	-160.40
3.290	-172.30
3.360	-183.10
3.440	-192.30
3.540	-201.10
3.640	-207.50

S1311A

ML	EH
0.000	309.90
.832	300.00
1.459	290.00
1.918	280.00
2.255	269.95
2.489	260.00
2.657	250.00
2.777	240.00
2.865	230.00
2.931	220.00
2.980	209.90
3.018	200.10
3.054	190.30
3.084	180.70
3.112	170.80
3.142	160.20
3.164	150.20
3.186	139.10
3.202	128.80
3.214	117.60
3.224	106.50
3.234	94.10
3.244	78.80
3.254	65.20
3.264	51.30
3.274	43.20
3.290	27.30
3.310	11.20
3.330	-1.50
3.360	-18.00
3.390	-29.90
3.430	-42.80
3.480	-55.50
3.550	-69.30
3.620	-80.50
3.700	-90.50
3.800	-100.70
3.940	-112.00
4.100	-122.50
4.300	-133.70
4.600	-147.90
4.900	-162.00
5.300	-178.60
5.600	-188.30
6.000	-202.70

T1315A

ML	EH
0.000	313.00
.948	303.00
1.652	293.00
2.160	282.95
2.518	273.00
2.778	262.65
2.948	252.90
3.067	242.90
3.152	233.00
3.220	221.15
3.254	212.25
3.280	202.85
3.300	192.80
3.320	178.10
3.334	161.64
3.344	138.70
3.354	92.40
3.360	59.20
3.370	1.80
3.380	-33.30
3.390	-52.80
3.400	-62.20
3.420	-74.90
3.444	-85.70
3.480	-98.35
3.550	-115.90
3.590	-124.80
3.660	-138.70
3.770	-158.55
3.892	-176.60
4.054	-192.30
4.214	-202.65
4.434	-212.30
4.729	-221.25
5.245	-231.70
6.034	-241.60

S1315A

ML	EH
0.000	313.00
.740	303.00
1.289	293.00
1.692	283.00
1.982	273.00
2.187	263.00
2.333	253.00
2.437	243.00
2.510	233.00
2.565	223.00
2.605	212.90
2.639	202.90
2.663	192.90
2.682	182.85
2.700	172.40
2.716	162.00
2.730	152.60
2.742	141.40
2.752	130.30
2.762	117.75
2.770	104.40
2.778	88.90
2.784	77.30
2.792	59.90
2.800	42.00
2.809	23.20
2.816	5.70
2.824	-12.40
2.836	-36.00
2.850	-53.50
2.870	-69.30
2.900	-84.00
2.940	-97.30
2.990	-111.00
3.050	-124.50
3.120	-138.40
3.220	-157.60
3.340	-176.90
3.470	-192.30
3.600	-202.60
3.772	-212.20
4.000	-221.20
4.400	-231.60
5.000	-241.60

QQ1433-4		QQ1433-2		QQ1437A		QQ1435A (forward, OH ⁻ titrant)		QQ1435A (back, H ⁺ titrant)	
ML	EH	ML	EH	ML	EH	ML	EH	ML	EH
0.000	295.65	0.000	298.55	0.000	303.20	0.000	308.8	2.000	290.8
.100	297.10	.100	297.40	.100	307.20	0.100	307.7	1.400	289.7
.650	290.40	.650	290.65	.670	300.10	0.700	300.5	1.000	270.5
1.200	282.10	1.200	282.20	1.300	289.95	1.300	289.35	0.720	259.4
1.800	269.80	1.800	269.85	1.800	278.75	1.800	280.9	0.550	249.5
2.150	259.60	2.200	257.20	2.030	269.60	1.350	290.35	0.440	240.6
2.400	249.10	2.400	248.10	2.300	260.30	1.800	280.9	0.350	230.7
2.550	240.50	2.550	238.90	2.470	249.90	2.200	269.05	0.280	219.9
2.650	233.10	2.670	229.00	2.580	240.30	2.400	260.7	0.230	209.4
2.750	223.65	2.770	217.70	2.650	230.30	2.580	250.6	0.194	200.1
2.830	213.50	2.840	207.00	2.720	219.55	2.710	240.5	0.164	190.7
2.890	203.40	2.890	197.20	2.760	209.90	2.806	230.3	0.140	181.2
2.950	189.30	2.926	188.30	2.790	200.20	2.880	219.8	0.116	169.7
3.000	173.90	2.956	179.70	2.812	190.30	2.930	210.5	0.098	160.2
3.030	161.70	2.990	169.00	2.830	180.20	2.970	201.0	0.084	152.0
3.050	151.70	3.020	157.50	2.844	169.40	3.000	192.2	0.072	143.65
3.070	140.00	3.050	144.00	2.854	159.50	3.054	171.95	0.060	132.6
3.090	126.40	3.080	128.70	2.862	150.40	3.074	161.9	0.050	123.2
3.110	105.20	3.100	115.65	2.870	140.50	3.093	151.9	0.040	109.5
3.120	89.70	3.115	99.90	2.877	129.10	3.120	142.0	0.032	096.9
3.128	74.20	3.125	86.20	2.884	111.10	3.131	121.1	0.026	084.4
3.134	59.10	3.132	70.80	2.893	99.60	3.140	111.2	0.020	067.8
3.140	43.00	3.138	55.20	2.892	83.30	3.146	100.9	0.015	056.3
3.146	29.60	3.142	43.10	2.895	59.20	3.152	090.8	0.004	021.6
3.152	-4.70	3.150	1.80	2.898	43.30	3.157	081.8	0.000	010.0
3.158	-21.00	3.160	-29.90	2.900	27.20	3.162	072.45		
3.170	-39.90	3.170	-45.30	2.903	-2.90	3.167	057.0		
				2.916	-49.40	3.170	052.1		
						3.173	044.5		
						3.177	032.5		
						3.180	024.4		
						3.184	010.0		

MSW427A		FF1437A	
ML	EH	ML	EH
0.000	295.80	0.000	309.00
.100	294.80	.100	307.90
.500	289.50	.650	301.20
1.200	281.70	1.300	290.90
1.700	273.40	1.800	279.70
2.000	267.00	2.100	270.20
2.400	255.40	2.300	261.40
2.750	238.60	2.450	250.00
2.950	220.70	2.600	238.30
3.050	203.30	2.650	226.40
3.130	168.40	2.740	211.40
3.150	142.10	2.770	199.00
3.170	48.90	2.786	189.40
3.180	-76.20	2.798	178.90
3.190	-105.90	2.808	165.40
3.200	-120.80	2.816	144.60
		2.820	131.90
		2.823	116.70
		2.826	91.70
		2.828	68.60
		2.830	48.50
		2.832	9.00
		2.834	-16.00
		2.836	-28.90
		2.841	-51.90

QQ1423A			QQ1426A			QQ2424A			QQ2425A			QQ3424A			QQ3425A		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	296.70		0.000	295.85		0.000	296.60		0.000	295.90		0.000	296.40		0.000	296.20	
.100	295.60		.100	294.80		.100	295.50		.100	294.80		.100	295.30		.100	295.15	
.600	289.70		.600	288.80		.600	289.40		.600	288.70		.600	289.15		.600	289.10	
1.200	280.90		1.200	273.00		1.200	280.40		1.200	279.70		1.200	278.40		1.200	280.10	
1.730	276.40		1.700	270.00		1.700	270.40		1.700	269.65		1.720	269.50		1.700	270.10	
2.100	260.30		2.000	262.10		2.000	262.20		2.000	261.50		2.050	260.30		2.000	262.00	
2.400	248.50		2.200	255.30		2.300	250.80		2.200	254.40		2.300	250.50		2.300	250.80	
2.600	236.90		2.400	246.80		2.500	239.50		2.360	247.10		2.490	240.00		2.500	239.75	
2.700	228.90		2.600	234.80		2.600	225.50		2.480	240.00		2.620	229.70		2.650	227.50	
2.780	220.85		2.800	215.30		2.760	211.70		2.580	232.50		2.700	220.90		2.720	219.50	
2.860	210.10		2.890	200.70		2.820	198.90		2.670	223.50		2.770	210.50		2.780	210.40	
2.920	193.40		2.940	189.50		2.850	189.80		2.750	212.30		2.820	200.20		2.830	200.20	
2.994	180.50		2.970	180.70		2.870	182.10		2.810	199.80		2.860	189.10		2.874	187.80	
3.030	166.80		3.000	170.30		2.890	173.10		2.850	188.00		2.900	177.90		2.900	177.70	
3.081	141.50		3.020	162.10		2.910	159.70		2.874	178.70		2.910	167.90		2.920	168.50	
3.050	158.40		3.040	153.00		2.924	149.40		2.900	164.30		2.930	156.00		2.940	157.00	
3.100	128.00		3.060	141.00		2.936	138.00		2.920	149.70		2.950	140.80		2.960	141.10	
3.120	110.20		3.074	132.00		2.950	118.50		2.934	136.40		2.960	131.10		2.974	128.00	
3.140	85.30		3.098	111.40		2.960	97.00		2.946	120.90		2.970	119.20		2.986	12.40	
3.156	52.10		3.108	99.80		2.966	78.90		2.954	105.30		2.960	103.50		2.996	93.90	
3.174	6.30		3.116	88.00		2.972	49.40		2.964	89.40		2.990	80.30		3.002	79.90	
3.182	-15.10		3.124	74.10		2.978	8.60		2.964	77.90		2.996	63.40		3.008	59.10	
3.190	-29.80		3.130	60.10		2.984	-47.20		2.968	64.00		3.000	46.70		3.012	45.30	
3.200	-43.10		3.136	46.00		3.000	-65.80		2.972	45.90		3.006	17.30		3.016	31.20	
3.216	-57.10		3.142	28.60		3.010	-93.90		2.978	9.90		3.012	-13.50		3.022	31.70	
3.236	-68.10		3.148	6.70		3.030	-130.30		2.984	-31.10		3.018	-36.10		3.028	-33.10	
3.260	-77.70		3.152	-6.90		3.050	-150.50		2.990	-62.70		3.026	-59.10		3.034	-57.20	
3.300	-89.60		3.160	-29.00		3.100	-168.60		3.000	-90.90		3.038	-79.20		3.040	-71.70	
3.360	-102.10		3.170	-44.30		3.200	-193.90		3.010	-106.70		3.054	-97.50		3.048	-88.30	
3.450	-115.60		3.184	-58.70		3.400	-216.10		3.030	-127.90		3.080	-115.50		3.060	-105.50	
3.570	-129.70		3.200	-69.70					3.050	-141.90		3.110	-131.60		3.080	-124.70	
3.700	-142.80		3.230	-84.40					3.080	-158.10		3.140	-143.70		3.150	-146.40	
3.830	-155.10		3.270	-96.60					3.120	-173.60		3.190	-161.20		3.200	-165.00	
4.000	-171.10		3.320	-108.10					3.170	-186.60		3.250	-177.90		3.200	-181.30	
4.200	-191.60		3.400	-121.80					3.250	-200.20		3.330	-193.30		3.270	-195.90	
4.400	-206.90								3.350	-210.90		3.450	-207.50		3.350	-206.50	
4.600	-220.42														3.450	-215.70	

FF1371A			FF2373A			FF3374B			FF1380A			FF2381B			FF3382B		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	299.20		0.000	299.50		0.000	299.10		0.000	298.30		0.000	298.50		0.000	298.00	
.760	290.10		.100	298.40		.100	298.05		.100	297.20		.100	297.40		.100	296.90	
1.390	280.00		.780	290.00		.750	290.05		.680	290.30		.670	290.60		.620	290.70	
1.840	270.00		1.400	280.05		1.370	280.10		1.330	280.30		1.320	280.60		1.284	280.70	
2.170	259.80		1.851	269.90		1.824	270.10		1.800	270.50		1.790	270.80		1.764	270.70	
2.390	249.80		2.170	259.95		2.150	259.90		2.154	260.00		2.140	260.60		2.110	260.70	
2.544	240.00		2.390	250.00		2.370	250.00		2.392	249.90		2.390	250.40		2.354	250.60	
2.652	230.00		2.544	240.00		2.530	239.90		2.550	240.40		2.544	240.40		2.522	240.50	
2.730	219.60		2.726	219.80		2.710	220.10		2.670	230.10		2.660	230.10		2.640	230.40	
2.780	210.00		2.780	209.40		2.762	210.10		2.750	220.00		2.740	220.00		2.720	220.20	
2.820	198.50		2.810	200.20		2.800	199.30		2.810	208.60		2.794	210.00		2.776	210.00	
2.840	189.80		2.836	189.70		2.822	189.90		2.842	200.40		2.830	200.30		2.812	200.10	
2.856	180.15		2.852	179.80		2.840	179.50		2.870	190.20		2.856	190.20		2.838	190.50	
2.872	168.80		2.865	169.60		2.851	169.70		2.890	179.60		2.874	180.50		2.856	179.50	
2.880	159.50		2.874	159.20		2.860	159.70		2.901	170.30		2.888	169.50		2.868	170.50	
2.894	136.50		2.884	141.10		2.866	149.40		2.910	159.70		2.900	151.90		2.878	159.40	
2.899	120.50		2.891	117.10		2.872	137.20		2.926	131.30		2.912	115.60		2.884	149.10	
2.904	91.20		2.896	37.80		2.878	109.90		2.932	112.00		2.916	74.80		2.888	140.10	
2.908	70.50		2.900	-59.30		2.882	80.30		2.937	89.50		2.920	-21.50		2.896	103.00	
2.913	37.30		2.906	-105.60		2.888	-60.00		2.941	75.00		2.924	-73.90		2.900	-2.50	
2.916	1.80		2.912	-120.80		2.894	-100.00		2.946	56.80		2.928	-93.90		2.904	-74.00	
2.920	-26.40		2.920	-133.90		2.900	-117.20		2.950	14.20		2.934	-110.70		2.908	-96.80	
2.925	-42.40		2.930	-145.20		2.905	-128.60		2.954	-16.60		2.942	-126.10		2.912	-107.90	
2.934	-60.40		2.944	-156.60		2.911	-136.60		2.958	-30.60		2.952	-140.20		2.918	-121.70	
2.944	-72.90		2.958	-165.00		2.924	-150.20		2.964	-45.10		2.972	-155.50		2.930	-139.00	
2.960	-85.40		3.000	-180.35		2.946	-164.50		2.972	-57.30		3.000	-170.40		2.948	-155.30	
3.000	-104.10		3.070	-195.30		2.990	-180.25		2.986	-71.10		3.026	-179.70		2.976	-170.20	
3.040	-117.70		3.194	-210.10		3.056	-195.20		3.005	-84.30		3.100	-196.00		3.022	-185.55	
3.100	-132.45		3.420	-225.10		3.180	-210.00		3.044	-100.40		3.210	-209.70		3.100	-200.10	
3.160	-146.10		3.670	-235.00		3.400	-224.70		3.100	-115.70		3.420	-224.30		3.250	-215.50	
3.230	-160.30		3.930	-242.30		3.600	-233.10		3.180	-131.70		3.630	-233.40		3.520	-230.50	
3.310	-175.50		4.500	-252.70		3.800	-239.20		3.270	-147.20		3.900	-241.40		3.850	-241.10	
3.420	-193.30					4.000	-224.00		3.350	-160.35		4.000	-243.70		4.000	-244.60	
3.580	-210.20								3.450	-176.15							
3.820	-225.00								3.550	-190.55							
4.150	-237.05								3.690	-206.00							
4.800	-250.70								3.810	-215.50							
5.500	-259.50								4.000	-225.80							

MD223B			MD298B			MD369A			MD376B			MD419B		
ML	EH		ML	EH		ML	EH		ML	EH		ML	EH	
0.000	303.1		0.000	310.9		0.000	301.0		0.000	298.3		0.000	297.7	
0.050	302.9		2.000	306.5		1.000	298.7		2.000	294.5		2.000	294.4	
0.100	302.75		4.000	301.4		2.000	296.15		4.000	290.3		4.000	290.7	
0.150	302.6		6.000	295.4		4.000	290.45		6.000	285.4		6.000	286.6	
0.200	302.4		8.000	288.0		6.000	283.6		8.000	279.8		8.000	282.0	
0.300	301.3		10.000	278.2		8.000	274.8		10.000	272.9		10.000	276.6	
1.000	299.4		11.500	267.7		9.700	264.55		10.700	270.1		12.000	270.1	
2.000	295.3		12.700	255.1		10.900	254.1		12.680	260.0		14.000	261.6	
3.000	290.7		13.300	245.5		11.700	243.9		14.000	250.6		15.700	251.8	
4.000	285.35		13.750	235.1		12.200	234.9		15.030	240.0		17.200	238.6	
5.000	278.9		14.050	224.9		12.600	224.4		15.700	229.8		17.800	230.7	
6.000	270.7		14.250	214.9		12.900	212.4		16.200	218.5		18.400	219.5	
6.900	260.6		14.400	203.4		13.080	201.0		16.460	209.8		18.800	208.1	
7.54	250.4		14.490	193.0		13.200	189.4		16.680	199.3		19.050	197.1	
8.000	239.5		14.550	183.05		13.300	172.8		16.810	190.05		19.220	185.7	
8.270	230.8		14.584	174.7		13.340	160.2		16.910	179.8		19.330	174.5	
8.470	220.0		14.620	162.7		13.360	150.5		16.978	170.05		19.420	159.55	
8.611	209.8		14.650	145.7		13.386	133.8		17.022	160.2		19.470	145.9	
8.700	200.2		14.660	136.1		13.400	114.25		17.053	150.0		19.500	131.8	
8.764	190.5		14.671	121.4		13.410	073.9		17.078	139.5		19.520	116.8	
8.810	180.1		14.680	097.2		13.420	-040.5		17.092	130.2		19.530	107.6	
8.840	170.6		14.690	052.2		13.430	-074.9		17.102	120.1		19.540	096.35	
8.870	154.6		14.700	-012.9		13.440	-089.3		17.108	110.8		19.550	081.8	
8.890	135.2		14.710	-049.2		13.450	-106.2		17.114	099.7		19.560	067.2	
8.905	104.1		14.720	-078.4		13.460	-120.1		17.118	089.5		19.570	051.3	
8.920	004.4		14.730	-091.7		13.530	-134.3		17.122	077.3		19.580	032.2	
8.935	-069.7		14.740	-099.3		13.600	-148.9		17.126	058.0		19.590	008.9	
8.950	-110.1		14.760	-111.9		13.730	-166.2		17.130	017.1		19.600	-036.0	
8.990	-136.7		14.780	-120.2		13.920	-180.4		17.132	-008.5		19.620	-081.9	
9.040	-151.9		14.810	-128.8		14.300	-196.4		17.136	-040.3		19.640	-097.7	
9.100	-163.5		14.850	-137.4		14.900	-210.5		17.140	-054.6		19.670	-112.0	
9.200	-175.6		14.900	-145.6		16.000	-225.1		17.144	-067.2		19.710	-126.1	
9.390	-189.35		14.980	-154.8		18.000	-239.5		17.148	-076.0		19.770	-138.8	
9.680	-201.9		15.120	-165.8		20.000	-248.4		17.156	-085.9		19.880	-154.0	
10.202	-214.9		15.300	-175.35					17.174	-100.9		20.000	-164.5	
11.100	-228.2		15.580	-185.4					17.190	-109.9		20.200	-176.7	
12.000	-236.6		16.000	-195.5					17.210	-120.0		20.600	-191.4	
			16.500	-203.8					17.240	-129.5		21.100	-202.9	
			17.300	-213.15					17.290	-140.9		22.000	-215.45	
			18.000	-219.1					17.350	-151.3				
			19.700	-229.3					17.420	-159.8				
			21.000	-234.8					17.540	-170.2				
			22.000	-238.3					17.720	-180.9				
			23.400	-242.35					17.940	-189.9				
			24.000	-243.8					18.300	-210.0				
			26.000	-248.05					18.830	-200.05				
									19.620	-220.0				
									20.000	-229.9				
									22.000	-236.8				

III. Organic Matter Titration Curves

Calculations for each titration made by the program TCRVDI are reported in Table 4. Weighted averages of the separate fraction titration curves were made, producing combined titration curves.

These combined titration curves are reported in Table 5.

The averages were made with values interpolated to each 0.1 pH unit.

Table 4. Calculated organic matter titration curves for organic sample - blank pairs. Ordering as in Table 2.

PH, calculated pH

MCMPOC, OH^- consumed by organic matter, $\mu\text{moles/mg OC}$

D0185A-C0184A			D0189B-C0188A			D1215A-C1213B			D2218B-C2217A		
PB	MC/POC		PB	MC/POC		PB	MC/POC		PB	MC/POC	
2.4682	1.455E 00		2.0008	1.658E 00		2.0074	1.251E 00		2.0000	6.921E-01	
2.4927	1.343E 00		2.0059	1.957E 00		2.0125	8.410E-01		2.0017	4.930E-01	
2.5181	1.573E 00		2.0110	2.125E 00		2.0159	5.815E-01		2.0034	4.654E-01	
2.5729	1.866E 00		2.0194	2.432E 00		2.0210	-5.045E-01		2.0051	4.562E-01	
2.6560	2.101E 00		2.0414	3.328E 00		2.0260	-9.119E-01		2.0127	4.638E-01	
2.7514	2.661E 00		2.0718	3.768E 00		2.0304	0.1557E 00		2.0270	8.413E-01	
2.8714	3.111E 00		2.0959	4.255E 00		2.0356	0.1613E 02		2.0406	4.985E-01	
2.9955	4.029E 00		2.1269	4.852E 00		2.0396	-9.867E-01		2.0541	-1.397E-01	
3.0725	4.962E 00		2.1566	5.452E 00		2.0496	0.176E 00		2.0600	-1.076E-01	
3.2014	6.121E 00		2.1885	5.452E 00		2.0596	-9.235E-01		2.1487	3.669E-02	
3.2504	6.565E 00		2.2223	5.634E 00		2.0677	-1.522E-01		2.1553	-9.703E-02	
3.3374	8.188E 00		2.2516	4.872E 00		3.0267	6.567E-01		2.2274	8.602E-02	
3.4321	7.601E 00		2.2781	4.985E 00		3.0448	1.029E 00		2.2654	8.481E-01	
3.4670	8.031E 00		2.3085	4.939E 00		3.0538	1.636E 00		2.3035	1.286E 00	
3.5254	9.755E 00		2.3423	5.189E 00		3.0728	2.147E 00		3.3045	1.821E 00	
3.6073	6.418E 00		2.3778	5.157E 00		3.0719	2.894E 00		3.3725	2.365E 00	
4.2524	7.340E 00		2.4167	5.594E 00		4.0409	3.342E 00		3.5416	2.714E 00	
4.3521	7.601E 00		2.4589	6.042E 00		4.2116	4.238E 00		3.6813	3.464E 00	
4.4629	8.031E 00		2.4910	5.707E 00		4.3790	4.648E 00		4.0487	3.896E 00	
4.6259	8.347E 00		2.5282	5.958E 00		4.5480	5.062E 00		4.2194	4.476E 00	
4.8203	8.347E 00		2.5688	5.838E 00		4.7170	5.560E 00		4.3893	4.840E 00	
5.1246	8.970E 00		2.6111	6.215E 00		4.8911	5.920E 00		4.5558	5.033E 00	
5.8734	9.276E 00		2.6567	6.365E 00		5.2123	6.741E 00		4.7874	5.231E 00	
6.1675	9.598E 00		2.7091	6.813E 00		5.9631	7.964E 00		5.0003	5.348E 00	
6.3788	9.832E 00		2.7683	7.105E 00		6.2705	8.270E 00		5.1846	5.629E 00	
6.6545	1.004E 01		2.8376	7.888E 00		6.5443	8.944E 00		5.4195	5.967E 00	
6.9096	1.028E 01		2.9204	8.291E 00		6.8215	9.757E 00		5.7661	6.130E 00	
7.1919	1.053E 01		3.0134	8.776E 00		6.8773	1.000E 01		6.1481	6.429E 00	
7.4758	1.077E 01		3.0894	8.946E 00		7.0142	1.036E 01		6.5571	6.719E 00	
7.7277	1.102E 01		3.1841	9.378E 00		7.1511	1.110E 01		7.0980	7.110E 00	
7.9491	1.127E 01		3.3024	9.783E 00		7.4976	1.334E 01		7.5477	7.437E 00	
8.2432	1.179E 01		3.4638	1.029E 01		7.8222	1.674E 01		7.8888	8.262E 00	
8.4427	1.234E 01		3.6472	1.096E 01		8.1484	2.482E 01		8.3168	9.746E 00	
8.6743	1.317E 01		3.8264	1.141E 01		8.5017	4.334E 01		8.5247	1.106E 01	
8.8501	1.367E 01		4.0402	1.183E 01		8.8279	5.801E 01		8.7427	1.304E 01	
9.0276	1.474E 01		4.4163	1.260E 01		9.6589	7.609E 01		8.9304	1.542E 01	
9.2490	1.606E 01		4.6023	1.295E 01		9.8292	9.751E 01		9.1231	1.837E 01	
9.5076	1.748E 01		4.7967	1.367E 01		9.2961	3.941E 01		9.2819	2.122E 01	
9.7341	1.873E 01		5.1457	1.388E 01		9.5057	1.805E 02		9.4679	2.468E 01	
9.9116	1.974E 01		5.6182	1.421E 01		9.6731	2.094E 02		9.6572	2.807E 01	
10.0773	2.054E 01		6.3078	1.458E 01					9.8753	3.322E 01	
10.2195	2.114E 01		6.6780	1.536E 01					10.0443	3.494E 01	
10.3714	2.171E 01		7.0752	1.570E 01					10.2167	3.761E 01	
10.4897	2.211E 01		7.5536	1.619E 01					10.3857	3.962E 01	
10.5844	2.248E 01		7.9086	1.661E 01					10.5514	4.179E 01	
10.6959	2.290E 01		8.1469	1.704E 01					10.5765	4.378E 01	
10.8328	2.330E 01		8.3768	1.750E 01							
10.9528	2.367E 01		8.6303	1.819E 01							
11.0864	2.397E 01		8.8946	1.891E 01							
11.1760	2.424E 01		9.0867	2.003E 01							
11.2174	2.443E 01		9.2604	2.092E 01							
11.2774	2.464E 01		9.4628	2.223E 01							
			9.5851	2.282E 01							
			9.8102	2.418E 01							
			10.0113	2.526E 01							
			10.2142	2.594E 01							

D322A-C5220B

PH	W-MELOC
1.9983	1.435E 00
2.0000	1.436E 00
2.0034	2.000E 00
2.0065	2.997E 00
2.0101	3.004E 00
2.0177	3.013E 00
2.0254	3.088E 00
2.1910	4.110E 00
2.3600	4.316E 00
2.5291	4.124E 00
2.6981	4.379E 00
2.8671	4.372E 00
3.0362	4.569E 00
3.2052	4.674E 00
3.3742	4.751E 00
3.5433	5.242E 00
3.7122	5.412E 00
3.8817	5.316E 00
4.0538	5.859E 00
4.2245	6.002E 00
4.3967	6.111E 00
4.5723	6.342E 00
4.7481	6.594E 00
4.9219	6.746E 00
5.0915	6.950E 00
5.2642	7.137E 00
5.4326	7.272E 00
5.6057	7.520E 00
5.7728	7.841E 00
5.9429	8.131E 00
6.1197	8.537E 00
6.2997	9.006E 00
6.4739	9.454E 00
6.6519	9.904E 00
6.8305	1.051E 01
7.0094	1.173E 01
7.1838	1.281E 01
7.3669	1.414E 01
7.5421	1.592E 01
7.7202	1.721E 01
7.8962	1.852E 01
8.0771	1.988E 01
8.2525	2.040E 01
8.4314	2.109E 01
8.6138	2.139E 01
8.7994	2.154E 01
8.9816	2.121E 01
9.1690	1.990E 01
9.3531	1.673E 01
9.5337	6.592E 00
9.7137	0.000E 00

S0313A-T0313A			S0296A-T0296A			S1299B-T1299B			S2303A-T2303A		
PH	MC/POC		PH	MC/POC		PH	MC/POC		PH	MC/POC	
1.9992	0.000E 00		2.0017	-4.340E-01		1.9993	4.099E-01		2.0003	0.000E 00	
2.1648	1.733E 00		2.1724	6.030E-01		2.0002	5.972E-01		2.1812	1.213E 00	
2.3355	3.225E 00		2.3398	2.041E 00		2.1827	2.082E 00		2.3502	1.986E 00	
2.5029	4.624E 00		2.5105	3.349E 00		2.3492	3.607E 00		2.5193	2.773E 00	
2.6719	5.584E 00		2.6778	3.940E 00		2.5199	4.956E 00		2.6883	3.523E 00	
2.8409	6.557E 00		2.8469	4.630E 00		2.6873	6.332E 00		2.8573	3.946E 00	
3.0100	7.164E 00		3.0176	5.409E 00		2.8563	7.510E 00		3.0264	4.351E 00	
3.1807	7.816E 00		3.1849	5.933E 00		3.0254	8.428E 00		3.1954	4.982E 00	
3.3463	8.383E 00		3.3556	6.493E 00		3.1952	9.289E 00		3.3644	5.363E 00	
3.5306	8.729E 00		3.5230	6.907E 00		3.3617	1.007E 01		3.5335	5.738E 00	
3.6844	9.295E 00		3.6886	7.662E 00		3.5291	1.103E 01		3.7025	6.170E 00	
3.8534	1.001E 01		3.8408	8.199E 00		3.6964	1.210E 01		3.8732	6.435E 00	
4.0208	1.076E 01		4.0166	8.657E 00		3.8654	1.322E 01		4.0423	6.783E 00	
4.1881	1.168E 01		4.2076	9.428E 00		4.0311	1.432E 01		4.2056	7.013E 00	
4.3403	1.276E 01		4.3918	1.024E 01		4.1917	1.550E 01		4.3837	7.331E 00	
4.5972	1.405E 01		4.5947	1.092E 01		4.3697	1.693E 01		4.5730	7.552E 00	
4.8051	1.501E 01		4.8110	1.158E 01		4.5196	1.804E 01		4.7725	7.836E 00	
5.0316	1.606E 01		5.0139	1.225E 01		4.7089	1.934E 01		4.9872	8.149E 00	
5.2818	1.702E 01		5.2471	1.285E 01		4.8780	2.054E 01		5.3709	8.514E 00	
5.5421	1.790E 01		5.5294	1.343E 01		5.1298	2.166E 01		5.9777	8.836E 00	
5.7618	1.859E 01		5.7475	1.393E 01		5.3496	2.243E 01		6.9141	9.089E 00	
6.0340	1.927E 01		6.1346	1.471E 01		5.5118	2.307E 01		7.9047	9.380E 00	
6.3027	2.008E 01		6.4405	1.541E 01		5.7130	2.378E 01		8.4574	9.649E 00	
6.5275	2.082E 01		6.6738	1.604E 01		5.9310	2.452E 01		8.8665	9.803E 00	
6.9958	2.190E 01		7.0000	1.693E 01		6.1170	2.520E 01		9.1741	9.825E 00	
7.3237	2.282E 01		7.2113	1.785E 01		6.3266	2.596E 01		9.4074	9.775E 00	
7.5688	2.376E 01		7.5375	1.874E 01		6.5007	2.679E 01		9.5916	9.755E 00	
7.7378	2.472E 01		7.7640	1.958E 01		6.6832	2.772E 01		9.8181	9.648E 00	
7.9356	2.617E 01		8.0091	2.089E 01		6.9165	2.914E 01		10.0193	9.717E 00	
8.1959	2.851E 01		8.2086	2.223E 01		7.1819	3.052E 01		10.1951	9.683E 00	
8.4444	3.184E 01		8.3979	2.403E 01		7.4506	3.189E 01		10.3878	9.687E 00	
8.7148	3.662E 01		8.6024	2.670E 01		7.6501	3.330E 01		10.5585	9.532E 00	
8.9752	4.275E 01		8.8120	2.977E 01		7.9239	3.497E 01		10.7267	9.796E 00	
9.2017	4.968E 01		8.9844	3.324E 01		8.1403	3.651E 01		10.8949	9.409E 00	
9.4248	5.789E 01		9.2008	3.839E 01		8.3245	3.846E 01		11.0639	9.405E 00	
9.6733	6.813E 01		9.5017	4.682E 01		8.6119	4.207E 01		11.2329	8.693E 00	
9.8998	7.879E 01		9.7705	5.478E 01		8.8080	4.558E 01		11.3369	8.009E 00	
10.2125	9.077E 01		10.0172	6.212E 01		9.0379	5.075E 01				
10.5150	1.002E 02		10.3164	7.233E 01		9.2830	5.761E 01				
10.7399	1.080E 02		10.5446	8.090E 01		9.5298	6.632E 01				
10.9224	1.134E 02		10.7694	9.035E 01		9.8442	7.868E 01				
11.0593	1.176E 02		10.9723	9.970E 01		10.0774	8.925E 01				
11.1650	1.214E 02		11.1464	1.080E 02		10.3022	9.906E 01				
			11.3239	1.180E 02		10.5254	1.091E 02				
			11.3560	1.196E 02		10.7400	1.201E 02				
						10.9074	1.318E 02				
						11.1187	1.446E 02				

S3306B-T3306B

FH	MCWFOC
2.06068	0.000E 00
2.18000	8.551E-01
2.3474	1.333E 00
2.5164	1.714E 00
2.6854	2.096E 00
2.8545	2.320E 00
3.0404	2.616E 00
3.2094	2.894E 00
3.3785	3.161E 00
3.5475	3.520E 00
3.7165	3.678E 00
3.8856	3.882E 00
4.0563	4.235E 00
4.2236	4.421E 00
4.3775	4.679E 00
4.5448	4.840E 00
4.7240	5.040E 00
4.9843	5.236E 00
5.2733	5.427E 00
5.6593	5.638E 00
6.1540	5.800E 00
6.8707	6.093E 00
7.7632	6.338E 00
8.4089	6.422E 00
8.7216	6.556E 00
8.9667	6.566E 00
9.1476	6.530E 00
9.3487	6.465E 00
9.5397	6.386E 00
9.6986	6.394E 00
9.8998	6.343E 00
10.0891	6.305E 00
10.2784	6.321E 00
10.4542	6.244E 00
10.6300	6.373E 00
10.8159	6.229E 00
10.9850	6.202E 00
11.1540	6.016E 00
11.3230	5.695E 00
11.4202	4.439E 00

CC0362B-DD0362B	PH	MCMFOC
	2.0005	-6.254E-01
	2.1383	1.223E 00
	2.3158	1.032E 00
	2.5304	1.786E 00
	2.7400	3.360E 00
	2.9834	4.822E 00
	3.1795	5.384E 00
	3.5294	6.102E 00
	3.7153	6.638E 00
	3.8979	6.918E 00
	4.0686	7.149E 00
	4.2377	7.706E 00
	4.4236	8.066E 00
	4.5808	8.379E 00
	4.7667	8.732E 00
	4.9290	9.355E 00
	5.1826	1.044E 01
	5.3584	1.142E 01
	5.5223	1.246E 01
	5.7082	1.421E 01
	5.8654	1.599E 01
	6.0751	1.866E 01
	6.2711	2.089E 01
	6.6447	2.536E 01
	7.1687	2.954E 01
	7.8938	3.229E 01
	8.1305	3.334E 01
	8.3671	3.532E 01
	8.5277	3.874E 01
	8.6799	4.293E 01
	8.8523	4.727E 01
	9.0974	5.211E 01

CC0366A-DD0362B	PH	MCMFOC
	2.0014	2.259E 00
	2.1687	4.732E 00
	2.3428	5.059E 00
	2.5093	5.891E 00
	2.6893	7.794E 00
	2.8778	9.622E 00
	3.0189	7.638E 00
	3.1880	8.122E 00
	3.3536	9.730E 00
	3.5429	8.700E 00
	3.7289	9.155E 00
	3.8878	9.506E 00
	4.0450	9.925E 00
	4.2208	1.034E 01
	4.4490	1.078E 01
	4.6332	1.118E 01
	4.8242	1.166E 01
	4.9493	1.215E 01
	5.1192	1.286E 01
	5.2738	1.359E 01
	5.4395	1.449E 01
	5.5561	1.560E 01
	5.7556	1.729E 01
	5.9009	1.891E 01
	6.0514	2.063E 01
	6.2035	2.209E 01
	6.3810	2.466E 01
	6.6092	2.712E 01
	6.8712	2.952E 01
	7.1552	3.118E 01
	7.4915	3.267E 01
	7.6995	3.341E 01
	7.8955	3.386E 01
	8.0358	3.455E 01
	8.2099	3.535E 01
	8.3553	3.690E 01
	8.5396	4.074E 01
	8.7086	4.572E 01
	8.9351	5.117E 01
	9.2799	5.979E 01
	9.8276	5.952E 01
	9.9476	6.055E 01
	10.0254	6.385E 01
	10.0828	7.434E 01

CC4364B-DD4364B	PH	MCMFOC
	2.0166	-1.853E 00
	2.1983	5.211E-01
	2.3605	2.513E 00
	2.5516	4.528E 00
	2.7831	5.863E 00
	3.0671	7.499E 00
	3.2868	8.659E 00
	3.5083	9.537E 00
	3.5793	9.826E 00
	3.7618	1.079E 01
	3.9511	1.126E 01
	4.1624	1.179E 01
	4.3822	1.258E 01
	4.6450	1.309E 01
	4.9062	1.338E 01
	5.2476	1.348E 01
	5.5603	1.362E 01
	5.8683	1.392E 01
	6.1621	1.429E 01
	6.5272	1.484E 01
	6.8010	1.537E 01
	7.0952	1.584E 01
	7.3234	1.646E 01
	7.5482	1.741E 01
	7.7764	1.857E 01
	8.0401	2.058E 01
	8.3122	2.388E 01
	8.5970	3.032E 01
	8.8599	4.015E 01
	9.0898	5.191E 01
	9.3196	6.392E 01
	9.5360	7.586E 01
	9.7710	8.682E 01
	10.1226	9.743E 01

N1255B-01257A			N1237A-01235A			N2250B-02254A			N3247B-03249A		
PH	MCMPDC		PH	MCMPDC		PH	MCMPDC		PH	MCMPDC	
2.0003	3.178E 00		2.0017	-5.560E-02		2.1261	8.441E-01		2.0007	-9.140E-02	
2.1195	3.904E 00		2.1758	-5.560E-02		2.2951	1.541E 00		2.0162	1.090E-01	
2.2857	6.562E 00		2.4243	7.689E-01		2.4741	7.620E-01		2.0811	5.397E-01	
2.4750	6.025E 00		2.7082	7.496E-01		2.6425	1.397E 00		2.1531	6.926E-01	
2.6826	6.735E 00		2.9398	1.657E 00		2.8347	1.235E 00		2.3180	1.043E 00	
2.8808	7.797E 00		3.1951	2.430E 00		2.9851	1.355E 00		2.4148	1.807E 00	
3.0904	9.302E 00		3.4461	3.862E 00		3.1435	1.606E 00		2.4861	1.499E 00	
3.2843	1.067E 01		3.6971	5.026E 00		3.2826	1.906E 00		2.6641	2.053E 00	
3.4297	1.153E 01		3.9692	6.007E 00		3.4533	2.217E 00		2.8296	2.462E 00	
3.6349	1.275E 01		4.1974	7.100E 00		3.6476	2.594E 00		3.0068	2.952E 00	
3.8367	1.393E 01		4.4577	8.114E 00		3.8406	3.203E 00		3.1569	3.344E 00	
4.0090	1.488E 01		4.6944	8.824E 00		4.0411	3.469E 00		3.3322	3.879E 00	
4.1611	1.556E 01		4.9682	9.525E 00		4.2128	3.909E 00		3.5093	4.359E 00	
4.3218	1.630E 01		5.2218	9.938E 00		4.3513	4.326E 00		3.6783	4.841E 00	
4.5198	1.706E 01		5.4179	1.018E 01		4.5588	4.703E 00		3.8325	5.311E 00	
4.7397	1.787E 01		5.6342	1.047E 01		4.8283	5.159E 00		4.0150	5.791E 00	
4.9601	1.846E 01		5.8776	1.070E 01		5.1557	5.722E 00		4.1929	6.371E 00	
5.1506	1.887E 01		6.1700	1.086E 01		5.6751	6.247E 00		4.3475	6.823E 00	
5.3605	1.930E 01		6.4270	1.104E 01		6.1068	6.463E 00		4.5149	7.198E 00	
5.5531	1.959E 01		6.7667	1.118E 01		6.5336	6.687E 00		4.6694	7.603E 00	
5.7955	1.989E 01		7.0473	1.134E 01		7.3502	6.873E 00		4.8611	8.031E 00	
6.0850	2.017E 01		7.3313	1.152E 01		8.2786	7.026E 00		5.0365	8.381E 00	
6.3607	2.052E 01		7.6406	1.174E 01		8.6915	7.140E 00		5.1925	8.652E 00	
6.6494	2.086E 01		7.8756	1.196E 01		8.9415	7.302E 00		5.3891	8.863E 00	
6.9346	2.121E 01		8.0970	1.224E 01		9.1866	7.444E 00		5.5766	9.044E 00	
7.2110	2.151E 01		8.3489	1.265E 01		9.4173	7.610E 00		5.7955	9.234E 00	
7.4395	2.172E 01		8.5923	1.293E 01		9.7005	7.756E 00		6.0847	9.410E 00	
7.6232	2.181E 01		8.8442	1.328E 01		10.0088	8.035E 00		6.3687	9.587E 00	
7.8435	2.199E 01		9.1078	1.421E 01		10.2416	8.024E 00		6.7664	9.749E 00	
8.0646	2.207E 01		9.3614	1.517E 01		10.4545	8.162E 00		7.2248	9.906E 00	
8.2006	2.202E 01		9.6133	1.649E 01		10.6337	7.818E 00		7.6802	1.006E 01	
8.3807	2.199E 01		9.8634	1.781E 01		10.8146	7.769E 00		8.0872	1.023E 01	
8.6403	2.152E 01		10.1203	1.913E 01		10.9640	7.905E 00		8.3857	1.035E 01	
8.8272	2.117E 01		10.3756	1.998E 01		11.1288	8.186E 00		8.6518	1.047E 01	
9.0095	2.060E 01		10.4855	1.998E 01		11.2823	6.745E 00		8.9420	1.064E 01	
9.2884	1.954E 01		10.6190	2.088E 01		11.4588	3.062E 00		9.2108	1.079E 01	
9.4895	1.860E 01		10.8861	2.094E 01					9.4135	1.094E 01	
9.7603	1.796E 01		11.0838	1.993E 01					9.6704	1.107E 01	
10.0304	1.764E 01		11.2275	2.009E 01					9.8910	1.127E 01	
10.3972	1.759E 01		11.3661	1.851E 01					10.0943	1.137E 01	
10.7421	1.822E 01		11.4777	1.806E 01					10.3286	1.153E 01	
10.9466	1.935E 01		11.5791	1.813E 01					10.6048	1.169E 01	
11.2035	1.954E 01		11.6552	1.578E 01					10.8556	1.196E 01	
11.3536	2.019E 01								11.0882	1.202E 01	
									11.2988	1.069E 01	

P1318A-W1318A			P1340B-W1340B			P2320A-W2320A			P2338B-W2338B		
PH	MC/POC		PH	MC/POC		PH	MC/POC		PH	MC/POC	
2.0005	0.000E 00		1.9998	0.000E 00		1.9992	0.000E 00		2.0008	0.000E 00	
2.1678	3.493E-01		2.0184	3.111E-02		2.1479	2.869E-01		2.0076	6.143E-01	
2.3369	7.878E-01		2.1452	6.640E-01		2.3169	6.944E-01		2.1597	1.324E 00	
2.5059	1.382E 00		2.3125	1.359E 00		2.4877	9.939E-01		2.3305	2.024E 00	
2.6749	1.911E 00		2.4799	2.286E 00		2.6550	1.074E 00		2.4978	2.766E 00	
2.8440	2.723E 00		2.6489	3.251E 00		2.8240	1.448E 00		2.6668	3.255E 00	
3.0130	3.570E 00		2.8196	4.223E 00		2.9914	1.629E 00		2.8460	3.712E 00	
3.1820	4.519E 00		2.9870	5.171E 00		3.1621	2.031E 00		3.0049	4.148E 00	
3.3511	5.317E 00		3.1560	6.119E 00		3.3311	2.287E 00		3.1739	4.533E 00	
3.5184	6.207E 00		3.3250	7.125E 00		3.5221	2.874E 00		3.3565	4.992E 00	
3.6900	7.081E 00		3.5034	8.081E 00		3.6709	3.036E 00		3.5103	5.348E 00	
3.8599	7.851E 00		3.6631	8.896E 00		3.9177	3.706E 00		3.6819	5.667E 00	
4.0272	8.620E 00		3.8305	9.669E 00		4.1678	4.122E 00		3.8551	6.086E 00	
4.1996	9.321E 00		4.0012	1.045E 01		4.4265	4.654E 00		4.0191	6.418E 00	
4.3551	9.860E 00		4.1761	1.117E 01		4.7037	5.173E 00		4.2405	6.952E 00	
4.5343	1.045E 01		4.3367	1.177E 01		4.9184	5.544E 00		4.4975	7.370E 00	
4.7219	1.098E 01		4.4931	1.227E 01		5.1449	5.848E 00		4.7527	7.695E 00	
4.8859	1.146E 01		4.6638	1.277E 01		5.4795	6.164E 00		5.0181	8.078E 00	
5.0414	1.181E 01		4.8404	1.320E 01		6.0576	6.427E 00		5.3257	8.355E 00	
5.2645	1.210E 01		5.0044	1.362E 01		6.8436	6.714E 00		5.6638	8.607E 00	
5.4809	1.228E 01		5.2317	1.402E 01		7.9880	6.954E 00		5.9833	8.771E 00	
5.7057	1.252E 01		5.5123	1.439E 01		8.7740	7.108E 00		6.3180	8.985E 00	
6.0066	1.276E 01		5.8166	1.470E 01		9.0800	7.278E 00		6.7743	9.266E 00	
6.4309	1.295E 01		6.1225	1.498E 01		9.2727	7.456E 00		7.5215	9.439E 00	
7.1814	1.345E 01		6.6482	1.548E 01		9.5042	7.601E 00		8.2821	9.551E 00	
7.5194	1.373E 01		6.9288	1.577E 01		9.7552	7.656E 00		8.7301	9.696E 00	
7.7476	1.404E 01		7.2331	1.609E 01		10.0198	7.829E 00		9.0107	9.863E 00	
7.9894	1.432E 01		7.5576	1.640E 01		10.2666	7.901E 00		9.2270	1.004E 01	
8.1263	1.465E 01		7.8010	1.662E 01		10.5117	8.279E 00		9.4451	1.023E 01	
8.2514	1.497E 01		7.9988	1.668E 01		10.7686	8.783E 00		9.6530	1.038E 01	
8.5945	1.629E 01		8.1797	1.670E 01		11.0238	9.017E 00		9.8558	1.065E 01	
8.8142	1.741E 01		8.4096	1.697E 01		11.0982			10.1533	1.084E 01	
9.1253	1.975E 01		8.6564	1.706E 01					10.3494	1.116E 01	
9.3940	2.219E 01		8.9031	1.719E 01					10.5979	1.160E 01	
9.6340	2.485E 01		9.1550	1.733E 01					10.8176	1.212E 01	
9.9552	2.800E 01		9.4018	1.812E 01					10.9613	1.249E 01	
10.3812	3.089E 01		9.6587	1.898E 01					11.0644	1.279E 01	
10.6651	3.245E 01		9.9376	2.099E 01							
10.8815	3.371E 01		10.1692	2.276E 01							
11.0370	3.454E 01		10.4498	2.443E 01							
11.2094	3.573E 01		10.6679	2.616E 01							
			10.9468	2.776E 01							

P3322A-W3322A

PH	MCNPOC
2.0000	0.000E 00
2.1183	6.336E-01
2.2890	8.499E-01
2.4564	1.364E 00
2.6254	1.967E 00
2.7953	2.090E 00
2.9652	2.518E 00
3.1427	2.968E 00
3.3032	3.364E 00
3.4782	3.629E 00
3.6396	4.183E 00
3.8154	4.600E 00
3.9785	4.973E 00
4.1501	5.403E 00
4.3191	5.736E 00
4.4814	6.163E 00
4.6318	6.379E 00
4.8296	6.766E 00
5.0122	7.084E 00
5.2539	7.418E 00
5.4872	7.720E 00
5.7813	7.995E 00
6.1667	8.227E 00
6.6991	8.460E 00
7.1927	8.615E 00
7.9381	8.750E 00
8.5145	8.962E 00
9.0030	8.924E 00
9.2363	8.930E 00
9.4053	8.825E 00
9.6166	8.838E 00
9.8837	8.898E 00
10.1102	8.957E 00
10.2852	9.063E 00
10.4652	8.941E 00
10.6334	9.100E 00
10.8049	9.144E 00
10.9773	9.158E 00
11.0881	9.170E 00

GG3374B-FF3374B			GG3421B-FF3374B			HH1377B-FF1371A			HH1399C-FF1371A		
PH	MC	POC	PH	MC	POC	PH	MC	POC	PH	MC	POC
1.9993	-6.653E-01		2.0008	-1.059E-00		2.0188	7.117E-01		2.0179	8.664E-01	
2.0179	-7.254E-01		2.0177	-7.068E-01		2.1337	1.341E-00		2.1168	1.371E-00	
2.1523	-1.993E-01		2.1310	-3.982E-01		2.3010	1.605E-00		2.2909	1.781E-00	
2.3205	5.827E-01		2.3009	-2.142E-01		2.4735	1.832E-00		2.4684	2.269E-00	
2.4912	9.518E-01		2.4606	5.384E-03		2.6425	2.411E-00		2.6340	2.818E-00	
2.6594	1.614E-00		2.6330	1.764E-01		2.8149	2.970E-00		2.8200	3.555E-00	
2.8276	2.115E-00		2.8088	3.695E-01		2.9806	3.586E-00		3.0127	4.296E-00	
2.9992	2.526E-00		2.9593	4.867E-01		3.1487	4.290E-00		3.1716	5.072E-00	
3.1690	2.902E-00		3.1198	7.389E-01		3.3203	5.040E-00		3.3136	5.785E-00	
3.3398	3.275E-00		3.2939	9.979E-01		3.4995	5.773E-00		3.4877	6.530E-00	
3.5122	3.669E-00		3.4562	1.253E-00		3.6618	6.519E-00		3.6542	7.261E-00	
3.6728	3.987E-00		3.6422	1.574E-00		3.8257	7.314E-00		3.8578	8.059E-00	
3.8638	4.443E-00		3.8078	1.862E-00		3.9948	8.010E-00		4.0167	8.662E-00	
4.0117	4.676E-00		3.9904	2.145E-00		4.1731	8.722E-00		4.1891	9.315E-00	
4.1815	5.077E-00		4.1493	2.445E-00		4.3345	9.427E-00		4.3430	9.800E-00	
4.3371	5.252E-00		4.3149	2.665E-00		4.5044	9.940E-00		4.5052	1.032E-01	
4.5340	5.674E-00		4.4823	2.922E-00		4.6810	1.055E-01		4.7165	1.068E-01	
4.6937	5.926E-00		4.6513	3.147E-00		4.8526	1.106E-01		4.9532	1.152E-01	
4.8526	6.175E-00		4.8119	3.360E-00		5.0157	1.148E-01		5.1154	1.193E-01	
5.0284	6.397E-00		5.0333	3.598E-00		5.1848	1.195E-01		5.3707	1.241E-01	
5.2110	6.525E-00		5.2446	3.761E-00		5.3572	1.230E-01		5.6564	1.270E-01	
5.3910	6.645E-00		5.5455	3.928E-00		5.5516	1.264E-01		5.9133	1.291E-01	
5.6251	6.745E-00		5.7686	4.050E-00		5.8896	1.290E-01		6.2311	1.313E-01	
5.9496	6.877E-00		6.2909	4.267E-00		6.1516	1.305E-01		6.4838	1.329E-01	
6.3604	7.016E-00		6.9315	4.471E-00		6.4643	1.319E-01		6.7754	1.348E-01	
6.8861	7.142E-00		7.6601	4.664E-00		6.9123	1.344E-01		7.0965	1.366E-01	
7.5284	7.253E-00		8.1655	4.947E-00		7.2182	1.360E-01		7.4464	1.378E-01	
7.9746	7.388E-00		8.5509	5.253E-00		7.4498	1.377E-01		7.6780	1.388E-01	
8.3296	7.456E-00		8.7723	5.610E-00		7.7017	1.393E-01		7.8639	1.403E-01	
8.6406	7.562E-00		9.0107	6.125E-00		7.9315	1.410E-01		8.1073	1.438E-01	
8.8367	7.664E-00		9.2777	6.880E-00		8.1935	1.454E-01		8.2662	1.473E-01	
9.0379	7.751E-00		9.6192	7.846E-00		8.4370	1.514E-01		8.4200	1.503E-01	
9.2272	7.897E-00		9.9944	8.494E-00		8.7159	1.591E-01		8.6043	1.548E-01	
9.3827	8.032E-00		10.2615	8.978E-00		8.9812	1.730E-01		8.8173	1.645E-01	
9.6041	8.179E-00		10.4559	9.212E-00		9.2365	1.895E-01		8.9897	1.729E-01	
9.8492	8.256E-00		10.6198	9.771E-00		9.6354	2.209E-01		9.1520	1.833E-01	
10.0918	8.218E-00		10.7939	9.592E-00		9.8895	2.364E-01		9.3210	1.953E-01	
10.3580	8.512E-00					10.2828	2.580E-01		9.4968	2.097E-01	
10.6149	8.447E-00								9.7098	2.259E-01	
10.8567	8.651E-00								9.9244	2.403E-01	
10.9834	8.774E-00								10.0985	2.494E-01	
11.1102	0.000E-00								10.2372	2.575E-01	
									10.4197	2.639E-01	
									10.6302	2.744E-01	
									10.8592	2.872E-01	
									10.9843	2.871E-01	

HH2378B-FF2373A			HH2399B-FF2373A			HH3378B-FF3374B			HH3399B-FF3374B		
PB	MC/POC		PB	MC/POC		PB	MC/POC		PB	MC/POC	
2.0002	-7.615E-04		2.0002	-7.605E-04		2.0002	-7.385E-01		2.0002	-7.353E-01	
2.0188	2.246E-02		2.0188	2.890E-02		2.0188	-7.966E-01		2.0188	-7.704E-01	
2.1371	8.151E-01		2.1438	2.520E-01		2.1337	-1.280E-01		2.1320	-4.766E-01	
2.3163	1.472E-01		2.2943	2.604E-01		2.3044	3.448E-01		2.3010	-1.152E-01	
2.4802	5.268E-01		2.4642	2.432E-01		2.4735	7.375E-01		2.4701	-8.461E-02	
2.6526	5.129E-01		2.6391	-7.025E-02		2.6416	1.241E 00		2.6408	2.630E-01	
2.8251	3.190E-01		2.8014	1.332E-02		2.8098	1.571E 00		2.8081	5.003E-01	
2.9890	6.489E-01		2.9738	5.333E-03		2.9806	1.861E 00		2.9890	6.597E-01	
3.1513	8.444E-01		3.1445	2.294E-01		3.1513	2.125E 00		3.1445	9.520E-01	
3.3389	1.008E 00		3.3136	2.441E-01		3.3186	2.535E 00		3.3220	1.323E 00	
3.5181	1.211E 00		3.4792	3.895E-01		3.4910	2.834E 00		3.4877	1.632E 00	
3.6668	1.453E 00		3.6449	6.501E-01		3.6567	3.240E 00		3.6516	1.967E 00	
3.8333	1.710E 00		3.8190	9.029E-01		3.8257	3.500E 00		3.8418	2.259E 00	
4.0032	2.042E 00		3.9914	1.068E 00		3.9948	3.890E 00		4.0387	2.670E 00	
4.1891	2.223E 00		4.1604	1.321E 00		4.1604	4.206E 00		4.2179	3.003E 00	
4.3497	2.355E 00		4.3835	1.620E 00		4.3463	4.585E 00		4.4309	3.397E 00	
4.5052	2.580E 00		4.6100	1.851E 00		4.5052	4.871E 00		4.6912	3.705E 00	
4.6777	2.799E 00		4.9413	2.113E 00		4.6954	5.078E 00		4.8670	3.978E 00	
4.8484	3.001E 00		5.1307	2.282E 00		4.8670	5.356E 00		5.0833	4.257E 00	
5.0005	3.169E 00		5.4535	2.521E 00		5.0225	5.587E 00		5.3166	4.473E 00	
5.4831	3.522E 00		5.8710	2.742E 00		5.1780	5.741E 00		5.5532	4.632E 00	
5.7882	3.664E 00		6.6384	2.912E 00		5.3538	5.916E 00		6.2091	4.926E 00	
6.2142	3.785E 00		7.8065	3.070E 00		5.5955	6.074E 00		6.9007	5.101E 00	
6.7382	3.907E 00		8.4623	3.187E 00		5.8372	6.184E 00		7.7912	5.237E 00	
7.5225	4.011E 00		8.7716	3.368E 00		6.1398	6.309E 00		8.2<78	5.377E 00	
8.0110	4.151E 00		8.9745	3.491E 00		6.5049	6.428E 00		8.6381	5.479E 00	
8.5637	4.254E 00		9.1621	3.636E 00		7.1151	6.524E 00		8.9609	5.579E 00	
8.8393	4.447E 00		9.3514	3.775E 00		7.6222	6.629E 00		9.1621	5.703E 00	
9.0404	4.520E 00		9.5205	3.930E 00		8.0549	6.741E 00		9.3920	5.728E 00	
9.2594	4.568E 00		9.7030	3.971E 00		8.3186	6.809E 00		9.5441	5.783E 00	
9.4579	4.603E 00		9.8163	4.124E 00		8.6770	6.918E 00		9.7486	5.902E 00	
9.6861	4.737E 00		10.0174	4.117E 00		8.8866	7.013E 00		9.9768	5.851E 00	
9.8416	4.903E 00		10.2338	4.175E 00		9.1933	7.116E 00		10.1729	5.877E 00	
10.1070	4.997E 00		10.4293	4.258E 00		9.4207	7.114E 00		10.3318	6.213E 00	
10.3572	4.972E 00		10.5938	4.716E 00		9.6574	7.127E 00		10.5482	6.131E 00	
10.6056	5.215E 00		10.7612	4.701E 00		9.9160	7.138E 00		10.7493	5.881E 00	
10.8626	5.482E 00		10.9268	5.585E 00		10.1949	7.088E 00		10.9555	6.402E 00	
11.0232	5.693E 00		11.0908	6.703E 00		10.3386	7.338E 00				
11.1398	6.319E 00					10.5837	7.245E 00				
11.3021	6.184E 00					10.8372	7.345E 00				
						10.9691	7.593E 00				
						11.0042	7.772E 00				

II1380A-FF1380A			
PH	MCMPOC		
2.0002	0.000E 00		
2.0171	4.055E-01		
2.1337	3.404E-01		
2.3010	9.618E-01		
2.4726	1.021E 00		
2.6374	1.963E 00		
2.8115	2.454E 00		
2.9806	2.960E 00		
3.1479	3.615E 00		
3.3237	4.356E 00		
3.4944	5.113E 00		
3.6533	5.768E 00		
3.8266	6.342E 00		
3.9998	7.001E 00		
4.1655	7.730E 00		
4.3480	8.400E 00		
4.5137	8.882E 00		
4.6675	9.365E 00		
4.8399	9.840E 00		
5.0056	1.024E 01		
5.1864	1.064E 01		
5.3428	1.091E 01		
5.5037	1.110E 01		
5.6737	1.131E 01		
5.8420	1.140E 01		
6.0023	1.154E 01		
6.1624	1.172E 01		
6.3252	1.186E 01		
6.4849	1.192E 01		
6.6477	1.173E 01		
6.8112	1.152E 01		
6.9779	1.117E 01		
7.1479	9.365E 00		
7.3198	7.729E 00		
7.4935	6.100E 00		
7.6702	4.617E 00		
7.8521	3.161E 00		
8.0368	2.098E 00		
8.2237	1.304E 00		
8.4139	1.001E 00		
8.6073	7.263E-01		
II1399C-FF1380A			
PH	MCMPOC		
2.0002	0.000E 00		
2.0179	2.061E-01		
2.1185	1.773E-01		
2.2943	3.934E-01		
2.4582	5.957E-01		
2.6349	9.423E-01		
2.8014	1.408E 00		
2.9890	1.927E 00		
3.1454	2.483E 00		
3.3051	3.096E 00		
3.5265	3.958E 00		
3.6575	4.410E 00		
3.8173	4.960E 00		
3.9863	5.534E 00		
4.1739	6.274E 00		
4.3430	6.798E 00		
4.5154	7.362E 00		
4.7284	8.007E 00		
5.0047	8.651E 00		
5.3521	9.320E 00		
5.6116	9.608E 00		
5.7924	9.747E 00		
5.9902	9.874E 00		
6.1871	1.005E 01		
6.4001	1.027E 01		
6.8294	1.053E 01		
7.2850	1.073E 01		
7.7726	1.066E 01		
8.1023	1.038E 01		
8.2865	1.019E 01		
8.4285	1.000E 01		
8.5756	9.599E 00		
8.7852	8.898E 00		
8.9440	8.241E 00		
9.1367	7.205E 00		
9.3565	5.874E 00		
9.6354	4.162E 00		
9.9312	2.391E 00		
10.2270	1.090E 00		
10.4535	3.196E-01		
10.6614	3.008E-01		
10.8516	3.261E-01		
II2381B-FF2381B			
PH	MCMPOC		
2.0002	0.000E 00		
2.0188	-8.147E-03		
2.1345	6.955E-02		
2.3010	1.864E-01		
2.4752	1.364E-01		
2.6450	1.112E-02		
2.8081	1.255E-01		
2.9806	3.185E-01		
3.1530	5.175E-01		
3.3288	6.555E-01		
3.4868	8.099E-01		
3.6651	1.089E 00		
3.8240	1.349E 00		
3.9964	1.476E 00		
4.1570	1.742E 00		
4.3548	2.066E 00		
4.5019	2.264E 00		
4.6709	2.510E 00		
4.8492	2.731E 00		
5.0208	2.883E 00		
5.1898	3.033E 00		
5.4231	3.198E 00		
5.6783	3.312E 00		
6.1685	3.422E 00		
7.7000	3.533E 00		
8.2240	3.660E 00		
8.5232	3.704E 00		
8.8342	3.724E 00		
9.0979	3.754E 00		
9.3244	3.816E 00		
9.6337	3.783E 00		
9.8839	3.852E 00		
10.0952	3.854E 00		
10.3352	4.009E 00		
10.5904	4.254E 00		
10.8491	4.409E 00		
10.9961	4.665E 00		
11.1178	4.961E 00		
II2404A-FF2381B			
PH	MCMPOC		
2.0002	-6.928E-04		
2.0171	4.218E-01		
2.1185	3.230E-01		
2.2841	2.305E-01		
2.4583	-2.776E-01		
2.6307	-6.004E-01		
2.7946	-3.308E-01		
2.9738	-3.830E-01		
3.1631	-2.476E-01		
3.3034	-4.670E-02		
3.5029	1.167E-01		
3.6719	2.878E-01		
3.8418	4.985E-01		
4.0624	8.679E-01		
4.2939	1.164E 00		
4.4917	1.445E 00		
4.8416	1.817E 00		
5.1814	2.072E 00		
5.4806	2.265E 00		
5.9437	2.439E 00		
6.7196	2.624E 00		
7.4177	2.727E 00		
8.0803	2.773E 00		
8.4234	2.841E 00		
8.6804	2.865E 00		
8.9339	2.888E 00		
9.2500	2.865E 00		
9.4275	2.963E 00		
9.6979	2.888E 00		
9.8687	2.936E 00		
10.0478	3.097E 00		
10.2186	3.004E 00		
10.3910	3.330E 00		
10.5837	3.724E 00		
10.7882	3.679E 00		
10.9108	4.054E 00		

JJ2386A-FF2381B			
PH	MC/POC		
2.0002	0.000E-00	2.0154	7.253E-01
2.0188	5.305E-03	2.1151	9.749E-01
2.1405	1.647E-01	2.2943	7.279E-01
2.3264	4.845E-01	2.4515	6.349E-01
2.4921	4.798E-01	2.6459	5.143E-01
2.6628	4.160E-01	2.8014	6.924E-01
2.8453	7.300E-01	2.9670	8.908E-01
3.0254	1.008E-00	3.1361	1.020E-00
3.1766	1.116E-00	3.3119	1.178E-00
3.3626	1.382E-00	3.4775	1.376E-00
3.5063	1.547E-00	3.6753	1.608E-00
3.6690	2.067E-00	3.8908	1.994E-00
4.0260	2.315E-00	4.0472	2.178E-00
4.2018	2.555E-00	4.2365	2.481E-00
4.3717	2.848E-00	4.4706	2.817E-00
4.5238	3.055E-00	4.7503	3.168E-00
4.6912	3.231E-00	4.9752	3.424E-00
4.8788	3.391E-00	5.2388	3.634E-00
5.0952	3.606E-00	5.5161	3.806E-00
5.4484	3.860E-00	5.7645	3.906E-00
5.6631	4.012E-00	6.1144	4.026E-00
5.9572	4.168E-00	6.4652	4.149E-00
6.2716	4.335E-00	7.0745	4.325E-00
6.6649	4.544E-00	7.8284	4.454E-00
7.6239	4.726E-00	8.3626	4.576E-00
8.3220	4.939E-00	8.6837	4.644E-00
8.7074	5.091E-00	8.8967	4.703E-00
9.0742	5.307E-00	9.1452	4.726E-00
9.3988	5.549E-00	9.3582	4.784E-00
9.6952	5.769E-00	9.5306	4.813E-00
9.9566	6.071E-00	9.6963	4.911E-00
10.2050	6.277E-00	9.9008	4.965E-00
10.4146	6.670E-00	10.0698	5.103E-00
10.5718	7.484E-00	10.2946	5.154E-00
10.7020	8.008E-00	10.6056	5.563E-00
10.8389	9.057E-00	10.7814	5.607E-00
11.0333	9.326E-00	10.9048	6.032E-00

JJ2405A-FF2381B			
PH	MC/POC		
1.9985	-3.904E-01	2.0171	-4.927E-01
2.0171	-4.927E-01	2.1405	-1.701E-01
2.1405	-1.701E-01	2.3112	2.933E-01
2.3112	2.933E-01	2.4819	5.177E-01
2.4819	5.177E-01	2.6493	9.314E-01
2.6493	9.314E-01	2.8200	1.346E-00
2.8200	1.346E-00	2.9806	1.641E-00
2.9806	1.641E-00	3.1648	1.902E-00
3.1648	1.902E-00	3.3474	2.454E-00
3.3474	2.454E-00	3.4894	2.716E-00
3.4894	2.716E-00	3.6753	3.134E-00
3.6753	3.134E-00	3.8308	3.458E-00
3.8308	3.458E-00	4.0167	3.892E-00
4.0167	3.892E-00	4.1875	4.247E-00
4.1875	4.247E-00	4.3328	4.505E-00
4.3328	4.505E-00	4.5205	4.880E-00
4.5205	4.880E-00	4.7148	5.222E-00
4.7148	5.222E-00	4.9397	5.500E-00
4.9397	5.500E-00	5.1239	5.730E-00
5.1239	5.730E-00	5.3808	5.959E-00
5.3808	5.959E-00	5.5938	6.136E-00
5.5938	6.136E-00	5.9015	6.327E-00
5.9015	6.327E-00	6.3004	6.532E-00
6.3004	6.532E-00	7.0475	6.701E-00
7.0475	6.701E-00	7.8453	6.864E-00
7.8453	6.864E-00	8.3524	6.984E-00
8.3524	6.984E-00	8.7868	7.133E-00
8.7868	7.133E-00	9.0421	7.243E-00
9.0421	7.243E-00	9.2804	7.359E-00
9.2804	7.359E-00	9.5948	7.405E-00
9.5948	7.405E-00	9.8771	7.450E-00
9.8771	7.450E-00	10.0901	7.485E-00
10.0901	7.485E-00	10.3504	7.773E-00
10.3504	7.773E-00	10.6090	7.764E-00
10.6090	7.764E-00	10.8609	7.850E-00
10.8609	7.850E-00	10.9961	8.180E-00
10.9961	8.180E-00	11.0975	0.000E-00

JJ3387A-FF3374B			
PH	MC/POC		
2.0002	-7.891E-01	2.0188	-8.147E-01
2.0188	-8.147E-01	2.1185	1.755E-01
2.1185	1.755E-01	2.2960	8.084E-01
2.2960	8.084E-01	2.4735	9.983E-01
2.4735	9.983E-01	2.6560	1.264E-00
2.6560	1.264E-00	2.8056	1.793E-00
2.8056	1.793E-00	2.9839	2.045E-00
2.9839	2.045E-00	3.2071	2.547E-00
3.2071	2.547E-00	3.4369	3.152E-00
3.4369	3.152E-00	3.6956	3.611E-00
3.6956	3.611E-00	3.9728	4.300E-00
3.9728	4.300E-00	4.2297	4.801E-00
4.2297	4.801E-00	4.4359	5.245E-00
4.4359	5.245E-00	4.7047	5.735E-00
4.7047	5.735E-00	5.1797	6.294E-00
5.1797	6.294E-00	5.4992	6.602E-00
5.4992	6.602E-00	6.0756	6.914E-00
6.0756	6.914E-00	6.9866	7.236E-00
6.9866	7.236E-00	7.5867	7.340E-00
7.5867	7.340E-00	8.0245	7.461E-00
8.0245	7.461E-00	8.5248	7.538E-00
8.5248	7.538E-00	8.7953	7.663E-00
8.7953	7.663E-00	9.0319	7.795E-00
9.0319	7.795E-00	9.2466	7.966E-00
9.2466	7.966E-00	9.4359	8.081E-00
9.4359	8.081E-00	9.7013	8.136E-00
9.7013	8.136E-00	9.9413	8.149E-00
9.9413	8.149E-00	10.1391	8.305E-00
10.1391	8.305E-00	10.3386	8.649E-00
10.3386	8.649E-00	10.5161	8.472E-00
10.5161	8.472E-00	10.6673	8.485E-00
10.6673	8.485E-00	10.8499	9.295E-00

JJ3405A-FF3374B			
PH	MC/POC		
2.0002	-7.891E-01	2.0188	-8.147E-01
2.0188	-8.147E-01	2.1185	1.755E-01
2.1185	1.755E-01	2.2960	8.084E-01
2.2960	8.084E-01	2.4735	9.983E-01
2.4735	9.983E-01	2.6560	1.264E-00
2.6560	1.264E-00	2.8056	1.793E-00
2.8056	1.793E-00	2.9839	2.045E-00
2.9839	2.045E-00	3.2071	2.547E-00
3.2071	2.547E-00	3.4369	3.152E-00
3.4369	3.152E-00	3.6956	3.611E-00
3.6956	3.611E-00	3.9728	4.300E-00
3.9728	4.300E-00	4.2297	4.801E-00
4.2297	4.801E-00	4.4359	5.245E-00
4.4359	5.245E-00	4.7047	5.735E-00
4.7047	5.735E-00	5.1797	6.294E-00
5.1797	6.294E-00	5.4992	6.602E-00
5.4992	6.602E-00	6.0756	6.914E-00
6.0756	6.914E-00	6.9866	7.236E-00
6.9866	7.236E-00	7.5867	7.340E-00
7.5867	7.340E-00	8.0245	7.461E-00
8.0245	7.461E-00	8.5248	7.538E-00
8.5248	7.538E-00	8.7953	7.663E-00
8.7953	7.663E-00	9.0319	7.795E-00
9.0319	7.795E-00	9.2466	7.966E-00
9.2466	7.966E-00	9.4359	8.081E-00
9.4359	8.081E-00	9.7013	8.136E-00
9.7013	8.136E-00	9.9413	8.149E-00
9.9413	8.149E-00	10.1391	8.305E-00
10.1391	8.305E-00	10.3386	8.649E-00
10.3386	8.649E-00	10.5161	8.472E-00
10.5161	8.472E-00	10.6673	8.485E-00
10.6673	8.485E-00	10.8499	9.295E-00

KK3387A-FF3382B			KK3408A-FF3382B			LL1392A-FF1380A			LL1410A-FF1380A		
PH	MCMPOC		PH	MCMPOC		PH	MCMPOC		PH	MCMPOC	
2.0162	5.940E-01		2.1014	-1.742E-01		2.0002	0.000E-00		2.0025	-5.325E-01	
2.1329	1.961E-00		2.1513	6.685E-01		2.0179	1.758E-01		2.0211	-5.010E-01	
2.3095	3.122E-00		2.3212	1.429E-01		2.1388	1.904E-01		2.1352	-4.431E-01	
2.4844	4.110E-00		2.4944	9.766E-03		2.3213	7.179E-01		2.3026	-2.376E-01	
2.6442	4.650E-00		2.6635	-1.495E-01		2.4971	8.158E-01		2.4699	-1.411E-01	
2.8183	5.061E-00		2.8646	-5.265E-02		2.6619	7.653E-01		2.6406	2.179E-01	
2.9839	5.533E-00		2.9931	-3.259E-02		2.8327	1.060E-00		2.8131	4.247E-01	
3.1665	5.945E-00		3.1706	1.534E-01		2.9966	1.201E-00		3.0142	8.393E-01	
3.3727	6.483E-00		3.3345	4.556E-01		3.1834	1.515E-00		3.1562	9.493E-01	
3.4910	6.657E-00		3.5052	7.470E-01		3.3474	1.792E-00		3.3092	1.290E-00	
3.6702	7.100E-00		3.6700	1.072E-00		3.5164	2.092E-00		3.5010	1.617E-00	
3.8215	7.360E-00		3.8560	1.364E-00		3.6685	2.329E-00		3.6768	2.017E-00	
4.0100	7.867E-00		4.0030	1.786E-00		3.8646	2.743E-00		3.8264	2.253E-00	
4.1756	8.186E-00		4.1729	2.091E-00		4.0193	3.044E-00		3.9726	2.569E-00	
4.3362	8.503E-00		4.3639	2.445E-00		4.2196	3.588E-00		4.1366	3.032E-00	
4.5052	8.845E-00		4.5262	2.724E-00		4.3590	3.883E-00		4.2498	3.355E-00	
4.6472	9.108E-00		4.6800	2.984E-00		4.5517	4.214E-00		4.5862	3.924E-00	
4.8196	9.391E-00		4.8888	3.249E-00		4.8518	4.722E-00		4.8398	4.313E-00	
5.0445	9.698E-00		5.1398	3.573E-00		5.0563	4.982E-00		5.0460	4.572E-00	
5.3217	1.002E-01		5.4373	3.922E-00		5.3115	5.238E-00		5.3181	4.817E-00	
5.5262	1.025E-01		5.7568	4.234E-00		5.6699	5.439E-00		5.5666	5.009E-00	
5.8862	1.047E-01		6.1354	4.455E-00		6.1550	5.559E-00		5.9165	5.104E-00	
6.3207	1.069E-01		6.5630	4.671E-00		7.1388	5.717E-00		6.3205	5.187E-00	
7.1134	1.086E-01		7.7733	4.952E-00		8.1090	5.075E-00		6.7938	5.327E-00	
8.0837	1.098E-01		8.6236	5.159E-00		8.4724	4.327E-00		7.3212	5.409E-00	
8.8021	1.109E-01		8.9312	5.319E-00		8.7987	2.856E-00		7.6440	5.405E-00	
9.1131	1.118E-01		9.3605	5.532E-00		9.0489	1.171E-00		7.8688	5.387E-00	
9.3548	1.118E-01		9.6192	5.696E-00		9.2213	-2.963E-01		8.0717	5.338E-00	
9.6591	1.122E-01		9.8169	6.129E-00		9.3954	-1.871E-00		8.2492	5.388E-00	
9.9329	1.117E-01		10.0739	6.178E-00		9.6438	-4.270E-00		8.4469	5.435E-00	
10.1712	1.142E-01		10.2919	6.398E-00		9.8974	-6.509E-00		8.7292	5.462E-00	
10.4299	1.134E-01		10.4680	6.425E-00		10.1290	-8.219E-00		8.9836	5.276E-00	
10.7003	1.112E-01		10.6486	6.769E-00		10.3217	-9.336E-00		9.2346	5.141E-00	
10.9336	1.123E-01		10.7939	6.402E-00		10.5854	-1.037E-01		9.5473	4.878E-00	
11.0722	1.020E-01					10.7705	-1.113E-01		9.8837	4.326E-00	
						10.8981	3.550E-00		10.1339	3.991E-00	
									10.3993	3.728E-00	
									10.6004	3.973E-00	
									10.7576	4.276E-00	

LL2393A-FF2381B		
PB	MCPOC	
2.0002	-5.015E-04	
2.0171	-2.963E-01	
2.1413	2.763E-02	
2.3298	-1.129E-01	
2.4971	-2.630E-01	
2.6662	-4.883E-01	
2.8369	-4.112E-01	
3.0059	-3.063E-01	
3.1885	-1.520E-01	
3.3482	-1.152E-02	
3.5181	1.819E-01	
3.7023	4.555E-01	
3.8595	6.929E-01	
4.0336	9.612E-01	
4.1968	1.231E 00	
4.3734	1.618E 00	
4.5323	1.889E 00	
4.7081	2.227E 00	
4.8822	2.661E 00	
5.0343	2.976E 00	
5.1695	3.356E 00	
5.3605	3.809E 00	
5.5482	4.165E 00	
5.7764	4.383E 00	
6.1550	4.678E 00	
6.6722	4.962E 00	
6.9883	5.132E 00	
7.2841	5.370E 00	
7.7186	5.705E 00	
8.0955	5.976E 00	
8.5418	6.307E 00	
8.7818	6.496E 00	
9.1182	6.853E 00	
9.3717	7.180E 00	
9.6540	7.497E 00	
9.8720	7.707E 00	
10.0833	7.968E 00	
10.2287	7.999E 00	
10.4611	8.210E 00	
10.7088	8.142E 00	
10.8719	8.579E 00	
11.0418	8.778E 00	

LL2409A-FF2381B		
PB	MCPOC	
2.0017	-2.665E-01	
2.0203	-2.394E-01	
2.1471	-6.502E-01	
2.2958	-1.1005E 00	
2.4733	-1.514E 00	
2.6508	-1.620E 00	
2.8097	-1.644E 00	
2.9973	-1.599E 00	
3.1452	-1.545E 00	
3.3269	-1.453E 00	
3.5035	-1.310E 00	
3.6667	-1.026E 00	
3.8594	-7.681E-01	
4.0690	-4.556E-01	
4.2634	9.782E-03	
4.5237	4.704E-01	
4.7544	9.403E-01	
4.9581	1.360E 00	
5.1187	1.744E 00	
5.3536	2.352E 00	
5.7694	2.926E 00	
6.6180	3.508E 00	
7.0372	3.736E 00	
7.3279	3.973E 00	
7.6981	4.185E 00	
8.3438	4.600E 00	
8.8374	5.000E 00	
9.3851	5.379E 00	
9.6826	5.635E 00	
9.9547	5.904E 00	

LL3393A-FF3382B		
PB	MCPOC	
2.0002	0.000E 00	
2.0188	1.485E-02	
2.1405	6.208E-01	
2.3374	5.456E-01	
2.5056	5.059E-01	
2.6898	5.338E-01	
2.8403	6.508E-01	
3.0110	8.032E-01	
3.1927	1.039E 00	
3.3491	1.284E 00	
3.5426	1.642E 00	
3.6905	1.880E 00	
3.8621	2.241E 00	
4.0311	2.554E 00	
4.1925	2.869E 00	
4.3700	3.139E 00	
4.5272	3.394E 00	
4.7013	3.688E 00	
4.8670	3.954E 00	
5.0884	4.247E 00	
5.3183	4.473E 00	
5.5279	4.684E 00	
5.8102	4.889E 00	
6.1313	5.090E 00	
6.4170	5.219E 00	
6.7094	5.346E 00	
7.1861	5.530E 00	
7.8386	5.677E 00	
8.3338	5.831E 00	
8.7463	5.944E 00	
9.0015	6.019E 00	
9.2365	6.088E 00	
9.4275	6.210E 00	
9.6929	6.338E 00	
9.9498	6.384E 00	
10.1205	6.455E 00	
10.3859	6.591E 00	
10.6310	6.516E 00	
10.8051	6.104E 00	
10.9741	6.459E 00	
11.1060	6.768E 00	

LL3409A-FF3382B		
PB	MCPOC	
2.0008	-1.382E-01	
2.0203	-2.676E-01	
2.1437	1.719E-01	
2.3000	5.584E-02	
2.4784	4.129E-01	
2.6575	4.742E-01	
2.8080	4.359E-01	
2.9855	8.220E-01	
3.1579	1.006E 00	
3.3387	1.379E 00	
3.4875	1.681E 00	
3.6548	1.993E 00	
3.8408	2.444E 00	
4.0521	2.846E 00	
4.4662	3.522E 00	
4.6741	3.910E 00	
4.9006	4.291E 00	
5.1550	4.578E 00	
5.4872	4.891E 00	
5.7559	5.097E 00	
6.0788	5.299E 00	
6.5166	5.490E 00	
6.9899	5.679E 00	
7.3060	5.795E 00	
8.0774	5.936E 00	
8.4435	6.069E 00	
8.7512	6.220E 00	
8.9574	6.343E 00	
9.1417	6.517E 00	
9.3546	6.719E 00	
9.6268	6.837E 00	
9.8871	6.945E 00	
10.1406	7.215E 00	
10.3502	7.157E 00	
10.5218	7.139E 00	
10.6596	7.560E 00	
10.8472	7.222E 00	

MM1396A-FF1380A		
PH	MC/POC	
2.0002	-6.252E-04	
2.0179	1.889E-01	
2.1405	4.875E-02	
2.3129	-1.069E-01	
2.4735	-2.007E-01	
2.6459	6.204E-02	
2.8234	2.201E-01	
2.9907	5.860E-01	
3.1699	1.007E 00	
3.3237	1.232E 00	
3.4927	1.878E 00	
3.6719	2.364E 00	
3.8240	2.743E 00	
3.9948	3.263E 00	
4.1655	3.898E 00	
4.3633	4.557E 00	
4.5154	5.015E 00	
4.6760	5.486E 00	
4.8399	5.964E 00	
5.0090	6.489E 00	
5.1763	6.939E 00	
5.3369	7.382E 00	
5.5076	7.820E 00	
5.6462	8.219E 00	
5.8000	8.605E 00	
6.1127	9.225E 00	
6.4153	9.808E 00	
6.7939	1.029E 01	
7.1607	1.058E 01	
7.4295	1.087E 01	
7.6932	1.105E 01	
8.1834	1.101E 01	
8.6127	1.006E 01	
8.9474	8.301E 00	
9.2061	6.169E 00	
9.5052	3.335E 00	
9.8636	7.899E-02	
10.1053	-1.691E 00	
10.3318	-2.974E 00	
10.5380	-3.515E 00	
10.7274	-4.159E 00	
10.9353	0.000E 00	
MM1410A-FF1380A		
PH	MC/POC	
2.0008	-1.498E-01	
2.0194	-1.497E-01	
2.1242	-2.590E-01	
2.2983	-4.241E-01	
2.4623	-5.344E-01	
2.6466	-3.338E-01	
2.7987	-5.890E-02	
2.9677	1.521E-01	
3.1706	5.781E-01	
3.3193	9.922E-01	
3.4740	1.444E 00	
3.6472	1.873E 00	
3.8163	2.281E 00	
3.9904	2.770E 00	
4.1594	3.404E 00	
4.3267	3.875E 00	
4.4958	4.302E 00	
4.6851	4.812E 00	
4.8533	5.212E 00	
5.0063	5.588E 00	
5.1626	5.965E 00	
5.3545	6.353E 00	
5.5742	6.721E 00	
5.7196	7.034E 00	
5.9292	7.468E 00	
6.2098	7.992E 00	
6.5276	8.535E 00	
6.9332	8.964E 00	
7.1969	9.209E 00	
7.5367	9.349E 00	
7.7311	9.406E 00	
8.1858	9.146E 00	
8.5526	8.374E 00	
8.9582	6.144E 00	
9.4062	2.194E 00	
9.7476	-1.136E 00	
10.0248	-3.359E 00	
10.2547	-4.783E 00	
10.4035	-5.558E 00	
10.5843	-5.964E 00	
10.7669	-6.581E 00	
MM2394A-FF2381B		
PH	MC/POC	
2.0162	4.430E-01	
2.1396	3.128E-01	
2.3256	6.495E-01	
2.4921	5.987E-01	
2.6746	6.715E-01	
2.8208	6.852E-01	
3.0051	9.653E-01	
3.1792	1.249E 00	
3.3938	1.557E 00	
3.5494	1.741E 00	
3.7049	2.027E 00	
3.8663	2.249E 00	
3.9922	2.447E 00	
4.1663	2.665E 00	
4.3658	3.029E 00	
4.5450	3.305E 00	
4.7698	3.552E 00	
5.0014	3.820E 00	
5.2870	4.058E 00	
5.5693	4.260E 00	
5.8905	4.404E 00	
6.1812	4.508E 00	
6.4686	4.613E 00	
6.7796	4.715E 00	
7.1616	4.813E 00	
7.6450	4.887E 00	
8.0372	4.958E 00	
8.3567	5.025E 00	
8.5680	5.073E 00	
8.8316	5.106E 00	
9.0683	5.156E 00	
9.4097	5.250E 00	
9.6041	5.225E 00	
9.7968	5.258E 00	
10.0588	5.379E 00	
10.2642	5.302E 00	
10.4915	5.361E 00	
10.7502	5.291E 00	
10.9243	5.539E 00	
11.0950	5.615E 00	
MM2411A-FF2381B		
PH	MC/POC	
2.0008	-1.150E-01	
2.0194	-8.940E-02	
2.1209	-9.731E-02	
2.3034	-4.719E-01	
2.4674	-8.760E-01	
2.6432	-1.011E 00	
2.8088	-9.910E-01	
2.9829	-9.801E-01	
3.1384	-7.596E-01	
3.3125	-5.905E-01	
3.4790	-4.336E-01	
3.6675	-1.910E-01	
3.8163	4.615E-02	
3.9819	2.778E-01	
4.1704	5.778E-01	
4.4028	9.053E-01	
4.5955	1.154E 00	
4.7628	1.352E 00	
4.9809	1.564E 00	
5.2902	1.791E 00	
5.5725	1.993E 00	
5.8345	2.142E 00	
6.0965	2.312E 00	
6.3906	2.479E 00	
6.6915	2.647E 00	
6.8436	2.794E 00	
7.5654	3.013E 00	
8.6134	3.425E 00	
9.0242	3.759E 00	
9.4011	4.267E 00	
9.7459	4.634E 00	
9.9944	4.915E 00	
10.1922	5.115E 00	
10.3917	5.432E 00	
10.5641	5.703E 00	
10.7348	5.873E 00	

MM3394A-FF3374B			MM3411A-FF3374B			NN1396A-FF1371A			NN1413A-FF1371A		
PB	MC/POC		PB	MC/POC		PB	MC/POC		PB	MC/POC	
2.0002	-7.710E-01		2.0008	-9.293E-01		2.0162	1.059E 00		2.0203	3.193E-01	
2.0188	-8.001E-01		2.0177	-6.260E-01		2.1371	1.235E 00		2.1209	3.928E-01	
2.1438	-7.187E-01		2.1242	-2.868E-01		2.3188	1.544E 00		2.2688	7.351E-01	
2.3196	-6.958E-01		2.2950	-1.912E-01		2.24785	2.209E 00		2.4336	7.695E-01	
2.4878	-6.394E-01		2.4657	-2.453E-01		2.6501	2.575E 00		2.6161	8.937E-01	
2.6594	-3.403E-01		2.6364	1.781E-01		2.8225	3.137E 00		2.8147	1.231E 00	
2.8318	-7.730E-02		2.8038	4.570E-01		2.9941	3.705E 00		2.9542	1.661E 00	
2.9975	1.502E-01		2.9829	5.984E-01		3.1538	4.278E 00		3.1418	2.235E 00	
3.1580	4.318E-01		3.1537	8.273E-01		3.3347	4.878E 00		3.3176	2.818E 00	
3.3423	8.771E-01		3.3092	1.263E 00		3.5088	5.414E 00		3.4664	3.183E 00	
3.5172	1.205E 00		3.4968	1.649E 00		3.7945	6.414E 00		3.5762	3.652E 00	
3.6719	1.530E 00		3.6489	1.971E 00		4.0159	7.146E 00		3.7774	4.149E 00	
3.8536	1.877E 00		3.8222	2.361E 00		4.1824	7.586E 00		3.9532	4.874E 00	
4.0235	2.239E 00		3.9836	2.717E 00		4.3421	8.062E 00		4.1442	5.352E 00	
4.1866	2.615E 00		4.1526	3.023E 00		4.5264	8.481E 00		4.3166	5.832E 00	
4.3497	2.915E 00		4.3301	3.354E 00		4.7022	8.944E 00		4.4569	6.173E 00	
4.5154	3.251E 00		4.5380	3.699E 00		4.8374	9.271E 00		4.6310	6.670E 00	
4.6903	3.531E 00		4.7443	4.031E 00		5.0250	9.580E 00		4.8592	7.200E 00	
4.8822	3.808E 00		4.9724	4.399E 00		5.1704	9.889E 00		5.1212	7.635E 00	
5.0749	4.032E 00		5.2497	4.670E 00		5.3682	1.018E 01		5.3832	8.048E 00	
5.3622	4.322E 00		5.5945	4.883E 00		5.5794	1.046E 01		5.6131	8.323E 00	
5.7088	4.538E 00		5.9511	5.068E 00		5.9953	1.088E 01		5.8362	8.521E 00	
6.0401	4.748E 00		6.5106	5.255E 00		6.2894	1.129E 01		5.9951	8.685E 00	
6.5539	4.940E 00		7.2206	5.426E 00		6.5412	1.173E 01		6.1523	8.925E 00	
7.2622	5.111E 00		7.8832	5.602E 00		6.9943	1.209E 01		6.3450	9.299E 00	
8.0194	5.278E 00		8.2669	5.755E 00		7.5115	1.229E 01		6.6290	9.744E 00	
8.4403	5.383E 00		8.7470	5.986E 00		7.8073	1.245E 01		7.4200	1.013E 01	
8.8460	5.514E 00		9.0597	6.125E 00		8.0558	1.269E 01		7.8173	1.032E 01	
9.1503	5.641E 00		9.2760	6.266E 00		8.2366	1.297E 01		8.0573	1.057E 01	
9.4359	5.718E 00		9.4738	6.424E 00		8.4615	1.336E 01		8.3278	1.095E 01	
9.7081	5.746E 00		9.6344	6.645E 00		8.7099	1.389E 01		8.5602	1.151E 01	
10.0056	5.760E 00		9.8643	6.677E 00		9.0666	1.542E 01		8.8467	1.233E 01	
10.2338	5.747E 00		10.0789	6.698E 00		9.6413	1.875E 01		9.1002	1.350E 01	
10.4273	5.835E 00		10.2632	6.856E 00		9.9337	2.026E 01		9.3504	1.491E 01	
10.6107	6.092E 00		10.5032	6.934E 00		10.2887	2.191E 01		9.6192	1.662E 01	
10.8169	6.027E 00		10.6858	6.813E 00		10.6031	2.306E 01		9.9454	1.849E 01	
10.9674	6.305E 00		10.8218	7.202E 00		10.8076	2.336E 01		10.3595	2.017E 01	
11.1212	0.000E 00								10.5134	2.067E 01	
									10.6942	2.124E 01	

NN3412A-FF3374B

PH	MCNPOC
2.0135	3.191E-01
2.1141	9.136E-01
2.2916	1.205E-00
2.4572	1.192E-00
2.6432	1.417E-00
2.7970	1.775E-00
2.9745	1.888E-00
3.1317	2.213E-00
3.3176	2.498E-00
3.4807	2.827E-00
3.6624	3.239E-00
3.8450	3.617E-00
4.0259	3.851E-00
4.1526	4.157E-00
4.3352	4.476E-00
4.4665	4.852E-00
4.6665	5.082E-00
4.8676	5.336E-00
5.1161	5.610E-00
5.3274	5.768E-00
5.5573	5.936E-00
5.9359	6.109E-00
6.4430	6.300E-00
6.9924	6.486E-00
7.3119	6.614E-00
7.8359	6.803E-00
8.3802	7.071E-00
8.6438	7.380E-00
9.0292	7.914E-00
9.2760	8.427E-00
9.5735	9.002E-00
9.8406	9.640E-00
10.0840	1.004E-01
10.2733	1.053E-01
10.4576	1.082E-01
10.6080	1.176E-01

NN3395A-FF3374B

PH	MCNPOC
2.0002	-7.671E-01
2.0179	-6.490E-01
2.1438	-8.280E-01
2.3027	-4.851E-01
2.4870	-8.620E-01
2.6408	-4.757E-01
2.8208	-3.556E-01
2.9738	-1.696E-01
3.1420	2.071E-02
3.3220	3.336E-01
3.4927	5.883E-01
3.6567	9.546E-01
3.8249	1.232E-00
3.9948	1.554E-00
4.2382	2.027E-00
4.4664	2.430E-00
4.6726	2.740E-00
4.8653	3.093E-00
5.0673	3.220E-00
5.3436	3.428E-00
5.5887	3.591E-00
5.7933	3.708E-00
6.2547	3.993E-00
6.8261	4.087E-00
7.5276	4.258E-00
8.0820	4.439E-00
8.4674	4.543E-00
8.7277	4.692E-00
8.9153	4.786E-00
9.1131	4.927E-00
9.2906	5.097E-00
9.5779	5.284E-00
9.8230	5.453E-00
10.0343	5.449E-00
10.2431	5.521E-00
10.4738	5.574E-00
10.7011	5.534E-00
10.8896	6.061E-00
11.0164	6.429E-00
11.1127	0.000E-00

NN2412A-FF2381B

PH	MCNPOC
2.0008	-9.362E-02
2.0203	-1.880E-01
2.1225	-3.404E-01
2.2865	-3.764E-01
2.4539	-6.338E-01
2.6381	-7.583E-01
2.7919	-6.380E-01
2.9677	-6.152E-01
3.1283	-3.870E-01
3.3193	-2.536E-01
3.5441	5.512E-02
3.8112	3.551E-01
3.9718	6.536E-01
4.1273	8.475E-01
4.2726	1.061E-00
4.4113	1.278E-00
4.6023	1.484E-00
4.8355	1.775E-00
5.0384	2.004E-00
5.2361	2.167E-00
5.4221	2.294E-00
5.5522	2.378E-00
5.8818	2.492E-00
6.1506	2.578E-00
6.4464	2.662E-00
6.7338	2.747E-00
7.0313	2.832E-00
7.6178	2.938E-00
8.1435	3.032E-00
8.3988	3.137E-00
8.7520	3.207E-00
8.9718	3.281E-00
9.1611	3.389E-00
9.3318	3.519E-00
9.5363	3.600E-00
9.7104	3.635E-00
9.8643	3.711E-00
10.1246	3.869E-00
10.3376	3.997E-00
10.5049	4.076E-00
10.6553	4.189E-00
10.8379	4.825E-00

NN2395A-FF2381B

PH	MCNPOC
2.0002	0.000E-00
2.0188	7.009E-03
2.1438	-1.804E-01
2.3112	-2.628E-01
2.4836	-4.062E-01
2.6526	-5.258E-01
2.8200	-5.114E-01
2.9941	-3.789E-01
3.1682	-2.073E-01
3.3271	-5.899E-02
3.4877	1.689E-01
3.6719	4.166E-01
3.8426	6.376E-01
4.0015	8.654E-01
4.1756	1.095E-00
4.3514	1.373E-00
4.5255	1.569E-00
4.6895	1.765E-00
4.8518	1.955E-00
5.0394	2.139E-00
5.2912	2.346E-00
5.6141	2.504E-00
5.9268	2.625E-00
6.2885	2.756E-00
6.7601	2.881E-00
7.3315	3.000E-00
7.9332	3.089E-00
8.3643	3.180E-00
8.6770	3.229E-00
8.8781	3.275E-00
9.0759	3.334E-00
9.3413	3.438E-00
9.5424	3.518E-00
9.7571	3.535E-00
9.9684	3.646E-00
10.1983	3.652E-00
10.4062	3.770E-00
10.5938	4.024E-00
10.7679	3.825E-00
10.9319	4.143E-00
11.0967	4.377E-00

001413A-FF1371A			
PB	MC/POC		
2.0194	3.710E-01		
2.1192	7.212E-01		
2.2721	1.177E 00		
2.4353	1.598E 00		
2.6034	2.058E 00		
2.7750	2.594E 00		
2.9424	3.210E 00		
3.1038	3.754E 00		
3.2906	4.408E 00		
3.4545	4.994E 00		
3.6286	5.751E 00		
3.8044	6.355E 00		
3.9667	7.046E 00		
4.1307	7.562E 00		
4.3234	8.184E 00		
4.4670	8.689E 00		
4.6521	9.199E 00		
4.8440	9.655E 00		
4.9860	1.000E 01		
5.1347	1.032E 01		
5.3731	1.078E 01		
5.7128	1.121E 01		
6.1083	1.152E 01		
6.5309	1.180E 01		
6.7896	1.203E 01		
7.1259	1.224E 01		
7.5908	1.264E 01		
7.9018	1.297E 01		
8.2601	1.340E 01		
8.4697	1.380E 01		
8.7182	1.433E 01		
8.9768	1.512E 01		
9.2050	1.592E 01		
9.4687	1.706E 01		
9.7375	1.822E 01		
10.0046	1.922E 01		
10.2801	2.005E 01		
10.5235	2.042E 01		
10.6790	2.089E 01		
10.8210	2.129E 01		
001423A-FF1371A			
PB	MC/POC		
2.0194	3.683E-01		
2.1192	7.029E-01		
2.2747	1.159E 00		
2.4513	1.485E 00		
2.6322	1.879E 00		
2.7801	2.351E 00		
2.9728	2.924E 00		
3.1114	3.546E 00		
3.2948	4.274E 00		
3.4596	4.866E 00		
3.6388	5.608E 00		
3.7977	6.237E 00		
3.9684	6.899E 00		
4.1290	7.474E 00		
4.3048	8.065E 00		
4.4856	8.628E 00		
4.6707	9.146E 00		
4.8229	9.574E 00		
5.0012	1.001E 01		
5.2159	1.047E 01		
5.3426	1.070E 01		
5.4914	1.092E 01		
5.6553	1.113E 01		
5.8616	1.133E 01		
6.0898	1.154E 01		
6.3349	1.174E 01		
6.5698	1.196E 01		
6.8149	1.219E 01		
7.1225	1.246E 01		
7.4640	1.285E 01		
7.7666	1.324E 01		
8.0607	1.380E 01		
8.3430	1.473E 01		
8.6354	1.607E 01		
8.9194	1.815E 01		
9.1307	2.019E 01		
9.4282	2.349E 01		
10.1618	3.069E 01		
10.4779	3.269E 01		
002414A-FF2373A			
PB	MC/POC		
2.0008	-8.310E-02		
2.0194	-6.647E-02		
2.1209	2.965E-01		
2.2713	3.737E-01		
2.4386	3.913E-01		
2.6043	4.300E-01		
2.7733	4.718E-01		
2.9441	6.965E-01		
3.1131	9.445E-01		
3.3007	1.221E 00		
3.4934	1.559E 00		
3.6320	1.879E 00		
3.7977	2.192E 00		
3.9752	2.561E 00		
4.1459	2.931E 00		
4.2828	3.202E 00		
4.4518	3.496E 00		
4.6259	3.824E 00		
4.8440	4.178E 00		
5.0992	4.540E 00		
5.4948	4.964E 00		
6.0052	5.241E 00		
6.3602	5.394E 00		
6.8453	5.548E 00		
7.3423	5.704E 00		
7.8815	5.857E 00		
8.2162	6.004E 00		
8.4275	6.150E 00		
8.6726	6.382E 00		
8.9211	6.678E 00		
9.1780	6.978E 00		
9.4501	7.394E 00		
9.7138	7.901E 00		
10.0029	8.177E 00		
10.2209	8.457E 00		
10.4018	8.728E 00		
10.5573	9.029E 00		
10.6875	9.184E 00		
002420A-FF2373A			
PB	MC/POC		
2.0008	-8.282E-02		
2.0194	-5.865E-02		
2.1327	1.970E-01		
2.3051	-8.121E-02		
2.4894	-2.230E-01		
2.6423	-1.395E-01		
2.8190	-2.420E-02		
3.0269	2.200E-01		
3.1739	4.119E-01		
3.3075	6.715E-01		
3.4816	9.364E-01		
3.6591	1.286E 00		
3.8315	1.606E 00		
3.9954	1.908E 00		
4.1509	2.224E 00		
4.3005	2.483E 00		
4.4637	2.789E 00		
4.6648	3.098E 00		
4.8321	3.371E 00		
4.9741	3.567E 00		
5.1905	3.836E 00		
5.4102	4.046E 00		
5.6249	4.211E 00		
5.8210	4.332E 00		
6.1067	4.445E 00		
6.3365	4.517E 00		
6.5749	4.593E 00		
7.0651	4.703E 00		
7.5147	4.815E 00		
7.9491	4.928E 00		
8.2500	5.027E 00		
8.5475	5.158E 00		
8.8264	5.339E 00		
9.0326	5.466E 00		
9.3352	5.693E 00		
9.5516	5.877E 00		
9.8051	6.088E 00		
10.0248	6.262E 00		
10.2091	6.472E 00		
10.3815	6.672E 00		
10.5387	6.732E 00		
10.7061	6.765E 00		
10.8497	7.286E 00		

QQ2424A-FF2373A			QQ2425A-FF3374B		
PH	MC/POC		PH	MC/POC	
2.0186	5.645E-02		2.0008	-9.606E-01	-9.508E-01
2.1217	4.104E-01		2.0194	-9.860E-01	-7.993E-01
2.2738	3.366E-01		2.1234	-9.518E-01	-3.935E-01
2.4429	3.022E-01		2.3051	-8.963E-01	-4.323E-02
2.5815	1.248E-01		2.4555	-7.488E-01	5.472E-02
2.7742	2.253E-02		2.6111	-7.740E-01	3.115E-01
2.9652	1.038E-01		2.7767	-7.974E-02	5.428E-01
3.2018	3.547E-01		2.9542	1.291E-01	6.846E-01
3.4351	7.679E-01		3.1283	3.451E-01	8.670E-01
3.6515	1.143E 00		3.2770	6.908E-01	1.342E 00
3.8053	1.425E 00		3.4528	1.079E 00	1.699E 00
3.9354	1.649E 00		3.6269	1.457E 00	2.084E 00
4.0876	1.954E 00		3.8146	1.882E 00	2.538E 00
4.3141	2.215E 00		4.0039	2.287E 00	2.881E 00
4.4882	2.540E 00		4.1729	2.634E 00	3.264E 00
4.6809	2.798E 00		4.3741	3.036E 00	3.655E 00
5.0105	3.171E 00		4.6310	3.529E 00	4.125E 00
5.3739	3.514E 00		4.7950	3.790E 00	4.515E 00
5.6799	3.732E 00		4.9961	4.101E 00	4.873E 00
6.1785	3.917E 00		5.2615	4.391E 00	5.168E 00
6.8682	4.097E 00		5.6537	4.680E 00	5.339E 00
7.8114	4.263E 00		5.9393	4.892E 00	5.544E 00
8.1258	4.483E 00		6.2216	5.031E 00	5.686E 00
8.6007	4.768E 00		6.7186	5.230E 00	5.828E 00
8.8357	5.135E 00		7.2392	5.427E 00	6.024E 00
9.2160	5.579E 00		7.6212	5.639E 00	6.214E 00
9.5575	6.167E 00		8.0100	5.934E 00	6.421E 00
9.8634	6.756E 00		8.3497	6.327E 00	6.605E 00
10.2911	7.221E 00		8.6591	6.885E 00	6.836E 00
10.6663	7.667E 00		8.9633	7.757E 00	7.205E 00
			9.2355	8.730E 00	7.743E 00
			9.4400	9.571E 00	8.341E 00
			9.7358	1.076E 01	8.976E 00
			10.0181	1.163E 01	9.280E 00
			10.2784	1.247E 01	9.627E 00
			10.5184	1.324E 01	9.592E 00
					9.724E 00

QQ2425A-FF2373A			QQ3424A-FF3374B		
PH	MC/POC		PH	MC/POC	
2.0008	-1.528E-01		2.0008	-9.606E-01	
2.0194	-1.399E-01		2.0194	-9.860E-01	
2.1226	1.605E-01		2.1234	-9.518E-01	
2.2747	5.833E-02		2.3051	-8.963E-01	
2.4446	-9.349E-02		2.4555	-7.488E-01	
2.5823	-1.793E-01		2.6111	-7.740E-01	
2.7023	-5.194E-01		2.7767	-7.974E-02	
2.8257	-5.747E-01		2.9542	1.291E-01	
2.9457	-2.903E-01		3.1283	3.451E-01	
3.0725	-1.329E-01		3.2770	6.908E-01	
3.2246	4.383E-02		3.4528	1.079E 00	
3.4140	2.912E-01		3.6269	1.457E 00	
3.6253	5.964E-01		3.8146	1.882E 00	
3.8247	9.693E-01		4.0039	2.287E 00	
3.9819	1.300E 00		4.1729	2.634E 00	
4.2253	1.637E 00		4.3741	3.036E 00	
4.4721	2.051E 00		4.6310	3.529E 00	
4.6969	2.362E 00		4.7950	3.790E 00	
4.9589	2.697E 00		4.9961	4.101E 00	
5.2226	2.935E 00		5.2615	4.391E 00	
5.4914	3.159E 00		5.6537	4.680E 00	
5.6858	3.306E 00		5.9393	4.892E 00	
5.9207	3.446E 00		6.2216	5.031E 00	
6.2267	3.573E 00		6.7186	5.230E 00	
6.8352	3.764E 00		7.2392	5.427E 00	
7.5282	3.957E 00		7.6212	5.639E 00	
8.0624	4.168E 00		8.0100	5.934E 00	
8.5390	4.452E 00		8.3497	6.327E 00	
8.8061	4.808E 00		8.6591	6.885E 00	
9.1645	5.324E 00		8.9633	7.757E 00	
9.4011	5.782E 00		9.2355	8.730E 00	
9.6749	6.341E 00		9.4400	9.571E 00	
9.9370	6.775E 00		9.7358	1.076E 01	
10.1567	7.189E 00		10.0181	1.163E 01	
10.3866	7.701E 00		10.2784	1.247E 01	
10.5674	8.168E 00		10.5184	1.324E 01	

SI315A-TI315A

PH	MCNPOC
1.9997	0.000E 00
2.1687	1.992E 00
2.3377	3.427E 00
2.5068	5.190E 00
2.6758	6.659E 00
2.8448	7.927E 00
3.0139	8.947E 00
3.1829	1.008E 01
3.3519	1.074E 01
3.5210	1.171E 01
3.6917	1.239E 01
3.8607	1.343E 01
4.0298	1.418E 01
4.1996	1.489E 01
4.3763	1.568E 01
4.5521	1.645E 01
4.7110	1.735E 01
4.9003	1.804E 01
5.0879	1.868E 01
5.3000	1.934E 01
5.5257	1.982E 01
5.7877	2.029E 01
5.9838	2.065E 01
6.2779	2.112E 01
6.5805	2.159E 01
6.8982	2.213E 01
7.1941	2.252E 01
7.5000	2.289E 01
7.8989	2.342E 01
8.1947	2.400E 01
8.4618	2.438E 01
8.7103	2.505E 01
8.9351	2.606E 01
9.1667	2.686E 01
9.3949	2.819E 01
9.6298	2.963E 01
9.9544	3.127E 01
10.2806	3.306E 01
10.5409	3.388E 01
10.7150	3.469E 01
10.8773	3.527E 01
11.0294	3.566E 01
11.2052	3.672E 01
11.3742	3.675E 01

SI311A-TI311A

PH	MCNPOC
1.9993	0.000E 00
2.1667	1.544E 00
2.3357	2.700E 00
2.5047	3.826E 00
2.6746	5.352E 00
2.8428	6.181E 00
3.0118	6.983E 00
3.1809	7.862E 00
3.3499	8.768E 00
3.5189	9.753E 00
3.6897	1.060E 01
3.8553	1.131E 01
4.0210	1.264E 01
4.1832	1.391E 01
4.3506	1.530E 01
4.5298	1.692E 01
4.6988	1.820E 01
4.8864	1.948E 01
5.0605	2.046E 01
5.2498	2.116E 01
5.4375	2.170E 01
5.6471	2.223E 01
5.9057	2.275E 01
6.1356	2.330E 01
6.3705	2.385E 01
6.5074	2.450E 01
6.7762	2.553E 01
7.0483	2.685E 01
7.2630	2.822E 01
7.5419	3.025E 01
7.7431	3.231E 01
7.9611	3.511E 01
8.1758	3.849E 01
8.4091	4.305E 01
8.5984	4.743E 01
8.7674	5.235E 01
8.9398	5.826E 01
9.1308	6.641E 01
9.3083	7.592E 01
9.4976	8.810E 01
9.7377	1.066E 02
9.9760	1.246E 02
10.2566	1.481E 02
10.4206	1.653E 02
10.6640	1.835E 02

QQ1426A-MSW427A

PH	MCPOC
2.20177	4.970E-01
2.21209	-2.812E-01
2.22696	-1.917E-01
2.24336	-2.084E-01
2.25654	3.808E-01
2.27412	8.341E-01
2.29052	1.379E 00
3.31029	2.021E 00
3.31452	2.192E 00
3.33227	2.474E 00
3.35188	3.219E 00
3.36861	4.038E 00
3.38534	4.807E 00
4.40732	5.311E 00
4.42726	5.911E 00
4.45330	6.685E 00
4.47493	7.309E 00
5.50502	7.974E 00
5.53954	8.418E 00
5.55404	8.710E 00
5.7720	8.924E 00
6.0458	9.117E 00
6.4177	9.336E 00
6.7084	9.527E 00
7.2054	9.843E 00
7.5637	1.026E 01
7.8156	1.078E 01
8.0590	1.155E 01
8.2770	1.272E 01
8.5171	1.457E 01
8.8095	1.837E 01
9.0259	2.370E 01

GG3391A-FF3374B

PH	MCPOC
1.9993	-6.634E-01
2.0162	-3.772E-01
2.1413	-4.334E-01
2.3087	-2.618E-01
2.4794	-1.598E-01
2.6484	4.298E-02
2.8174	1.110E-01
2.9899	3.394E-01
3.1673	5.153E-01
3.3195	9.124E-01
3.4902	1.188E 00
3.6694	1.541E 00
3.8316	1.845E 00
3.9965	2.157E 00
4.1782	2.489E 00
4.3709	2.767E 00
4.4976	3.029E 00
4.7410	3.348E 00
4.9878	3.664E 00
5.2549	3.888E 00
5.6175	4.125E 00
6.3435	4.484E 00
6.7914	4.710E 00
7.4980	4.906E 00
8.1876	5.160E 00
8.6187	5.447E 00
8.8519	5.756E 00
9.2001	6.310E 00
9.5703	6.845E 00
9.8137	7.243E 00
9.9963	7.302E 00
10.1771	7.425E 00
10.3969	6.595E 00
10.5118	7.664E 00
10.6657	7.620E 00
10.8262	7.984E 00
10.9716	8.359E 00
11.1018	9.0600E 00

GG2390A-FF2373A

PH	MCMPQC
2.0002	-7.244E-04
2.0179	2.386E-01
2.1422	5.995E-01
2.3087	8.181E-02
2.4845	3.369E-02
2.6543	-7.031E-02
2.8166	-4.950E-02
2.9924	7.700E-02
3.1952	2.382E-01
3.3271	3.418E-01
3.4741	4.539E-01
3.6787	6.900E-01
3.8435	9.822E-01
4.0015	1.187E 00
4.1858	1.364E 00
4.3396	1.550E 00
4.5213	1.715E 00
4.7182	1.915E 00
4.9735	2.181E 00
5.3656	2.515E 00
5.6496	2.749E 00
6.0688	2.960E 00
6.7838	3.140E 00
7.5698	3.334E 00
7.9299	3.576E 00
8.5654	3.854E 00
9.0810	4.210E 00
9.8812	4.442E 00
9.3007	4.556E 00
9.5661	4.821E 00
9.8399	5.145E 00
10.0090	5.312E 00
10.2135	5.565E 00
10.4028	6.009E 00
10.5987	6.403E 00
10.8186	6.694E 00
11.0232	7.898E 00
11.1195	8.147E 00

GG1390A-FF1371A

PH	MCNPOC
2.0179	9.146E-01
2.1405	7.224E-01
2.3053	8.969E-01
2.4735	9.584E-01
2.6467	1.072E 00
2.8234	1.407E 00
2.9789	1.876E 00
3.1530	2.408E 00
3.3195	2.963E 00
3.4961	3.486E 00
3.6618	4.128E 00
3.8274	4.768E 00
3.9938	5.393E 00
4.1613	5.848E 00
4.3497	6.418E 00
4.5323	6.933E 00
4.6743	7.277E 00
4.8365	7.683E 00
4.9971	8.036E 00
5.1729	8.388E 00
5.3605	8.745E 00
5.5701	9.000E 00
5.8254	9.224E 00
6.1094	9.460E 00
6.7145	9.712E 00
7.0475	9.900E 00
7.4380	1.011E 01
7.7321	1.034E 01
8.1259	1.056E 01
8.3068	1.144E 01
8.4978	1.212E 01
8.7192	1.310E 01
8.9390	1.471E 01
9.1773	1.691E 01
9.4748	2.021E 01
9.7723	2.351E 01
10.0411	2.595E 01
10.3025	2.817E 01
10.6124	2.974E 01
10.8626	3.107E 01
11.0739	3.236E 01
11.2192	3.197E 01
11.2759	3.377E 01

QQ1437A-FF1437A

QQ1437A-FF1437A

pH	MCMPDC
2.0098	-1.062E 00
2.0177	3.453E-02
2.1378	-3.805E-01
2.3093	-8.551E-01
2.4986	-3.005E-01
2.6482	-1.423E-01
2.8088	2.409E-01
2.9863	7.916E-01
3.1486	1.790E 00
3.3176	2.195E 00
3.4943	2.879E 00
3.6624	3.064E 00
3.8247	3.866E 00
3.9937	4.321E 00
4.1645	4.983E 00
4.3470	5.595E 00
4.5093	6.140E 00
4.6682	6.655E 00
4.8355	7.170E 00
5.0292	7.695E 00
5.3325	8.055E 00
5.5235	8.355E 00
5.8024	8.633E 00
6.2038	8.844E 00
6.4795	8.920E 00
6.7507	9.059E 00
7.2578	9.195E 00
7.6288	9.441E 00
8.0455	9.852E 00

QQ1435A- forward) -FF1371A

QQ1435A- forward and back titrations

QQ1435A(back, H⁺ titrant)-FF1371A

pH	MCMPDC	pH	MCMPDC
3.155	2.73	7.052	10.64
3.328	3.37	6.855	10.50
3.505	4.02	6.506	10.31
3.662	4.72	6.269	10.17
3.823	5.33	6.074	10.03
3.972	5.90	5.794	9.87
4.153	6.50	5.582	9.72
4.314	7.03	5.370	9.46
4.484	7.51	5.138	9.12
4.652	8.03	4.979	8.75
4.820	8.43	4.792	8.37
4.991	8.81	4.651	8.00
5.174	9.17	4.513	7.56
5.341	9.46	4.352	7.09
5.515	9.62	4.158	6.51
5.686	9.78	3.997	5.89
5.838	9.92	3.838	5.79
5.996	10.05	3.681	4.94
6.257	10.16	3.504	4.14
6.340	10.25	3.321	3.59
6.468	10.32	3.154	2.93
6.671	10.44	3.003	2.13
6.808	10.54		
7.052	10.64		

Note: w₀ is for pH 3.5 for FFI
w₀ = 17.349

Table 5. Combined titration curve data. Units are $\mu\text{moles/mg OC}$.

pH	DO ¹	D	SO ¹	S	N	P
2.10	-3.61	-1.21	-5.62	-5.06	-2.75	-3.21
2.20	-2.95	28.76	-4.79	-4.32	-2.15	-2.90
2.30	-3.21	9.04	-3.92	-3.69	-1.55	-2.61
2.40	-2.96	-.97	-3.10	-3.06	-1.42	-2.24
2.50	-2.78	-1.03	-2.29	-2.43	-1.51	-1.85
2.60	-2.34	-.84	-1.81	-1.86	-1.27	-1.48
2.70	-1.82	-.57	-1.34	-1.30	-1.07	-1.15
2.80	-1.21	-.37	-.85	-.82	-.75	-.79
2.90	-.61	-.19	-.41	-.39	-.40	-.40
3.00	0.00	0.00	0.00	0.00	0.00	0.00
3.10	.17	.29	.36	.42	.40	.42
3.20	.61	.62	.70	.82	.80	.83
3.30	1.05	.81	1.04	1.14	1.27	1.23
3.40	1.47	1.01	1.31	1.48	1.72	1.61
3.50	1.66	1.24	1.53	1.89	2.14	2.01
3.60	1.94	1.48	1.89	2.25	2.55	2.41
3.70	2.21	1.72	2.30	2.60	2.98	2.78
3.80	2.46	2.08	2.69	2.99	3.38	3.15
3.90	2.69	2.42	3.06	3.38	3.76	3.51
4.00	2.92	2.69	3.41	3.76	4.12	3.86
4.10	3.10	3.02	3.87	4.14	4.51	4.19
4.20	3.34	3.39	4.35	4.50	4.91	4.51
4.30	3.56	3.62	4.93	4.91	5.28	4.80
4.40	3.77	3.82	5.43	5.31	5.62	5.08
4.50	3.95	4.00	5.85	5.66	5.92	5.34
4.60	4.10	4.17	6.27	6.02	6.21	5.58
4.70	4.27	4.35	6.65	6.40	6.50	5.82
4.80	4.43	4.49	7.03	6.74	6.75	6.04
4.90	4.54	4.61	7.43	7.05	6.98	6.26
5.00	4.64	4.75	7.83	7.31	7.20	6.47
5.10	4.75	4.93	8.17	7.55	7.38	6.62
5.20	4.86	5.11	8.49	7.76	7.56	6.76
5.30	4.97	5.25	8.79	7.97	7.70	6.88
5.40	5.07	5.38	9.06	8.16	7.84	6.99
5.50	5.17	5.49	9.33	8.34	7.96	7.10
5.60	5.26	5.59	9.61	8.51	8.08	7.19
5.70	5.36	5.68	9.88	8.67	8.18	7.28
5.80	5.46	5.77	10.14	8.82	8.27	7.37
5.90	5.56	5.86	10.36	8.98	8.35	7.44
6.00	5.67	5.95	10.58	9.14	8.42	7.51
6.10	5.77	6.03	10.83	9.29	8.49	7.57
6.20	5.88	6.11	11.09	9.44	8.57	7.64
6.30	5.99	6.21	11.35	9.59	8.65	7.70
6.40	6.10	6.34	11.63	9.77	8.73	7.76
6.50	6.19	6.48	11.92	9.95	8.80	7.82
6.60	6.28	6.62	12.19	10.14	8.86	7.88
6.70	6.37	6.77	12.44	10.34	8.92	7.94
6.80	6.47	6.93	12.69	10.56	8.98	8.01
6.90	6.58	7.12	12.94	10.77	9.05	8.07
7.00	6.67	7.26	13.19	10.96	9.11	8.13
7.10	6.76	7.50	13.55	11.14	9.17	8.19
7.20	6.85	7.87	13.91	11.32	9.24	8.25
7.30	6.93	8.13	14.19	11.50	9.30	8.31
7.40	7.02	8.40	14.51	11.68	9.35	8.36
7.50	7.10	8.67	14.84	11.88	9.41	8.42
7.60	7.20	9.15	15.22	12.12	9.45	8.49
7.70	7.31	9.66	15.69	12.34	9.51	8.56
7.80	7.43	10.17	16.24	12.54	9.58	8.63
7.90	7.54	11.17	16.88	12.74	9.64	8.67
8.00	7.70	12.29	17.57	12.98	9.70	8.73

¹ This represents the average of two titration curves for the fulvic acid sample before charcoal fractionation.

pH	GG	HH	II	JJ	KK	LL
2.10	-1.16	-1.88	-1.55	-1.26	-3.41	-.58
2.20	-1.17	-1.65	-1.43	-1.14	-1.58	-.51
2.30	-1.19	-1.53	-1.26	-1.03	-1.35	-.43
2.40	-1.11	-1.37	-1.20	-.97	-1.22	-.42
2.50	-.99	-1.19	-1.09	-.92	-1.08	-.42
2.60	-.88	-.97	-.86	-.90	-.93	-.38
2.70	-.70	-.74	-.63	-.78	-.72	-.34
2.80	-.43	-.52	-.43	-.48	-.49	-.25
2.90	-.21	-.27	-.22	-.23	-.25	-.12
3.00	0.00	0.00	0.00	0.00	0.00	0.00
3.10	.29	.31	.28	.22	.28	.11
3.20	.58	.63	.57	.47	.56	.24
3.30	.85	.95	.88	.77	.84	.40
3.40	1.12	1.25	1.19	1.07	1.08	.56
3.50	1.38	1.54	1.50	1.36	1.32	.72
3.60	1.70	1.87	1.80	1.69	1.65	.90
3.70	2.00	2.20	2.09	2.02	1.95	1.08
3.80	2.29	2.50	2.36	2.42	2.21	1.27
3.90	2.57	2.81	2.64	2.84	2.50	1.46
4.00	2.86	3.11	2.93	3.26	2.78	1.65
4.10	3.13	3.39	3.25	3.71	3.04	1.88
4.20	3.39	3.67	3.56	4.20	3.30	2.12
4.30	3.62	3.95	3.83	4.74	3.55	2.33
4.40	3.85	4.20	4.10	5.31	3.78	2.51
4.50	4.07	4.44	4.35	5.90	4.00	2.68
4.60	4.28	4.66	4.59	6.59	4.23	2.85
4.70	4.50	4.87	4.83	7.41	4.46	3.03
4.80	4.69	5.08	5.05	8.25	4.67	3.21
4.90	4.88	5.29	5.25	8.98	4.85	3.37
5.00	5.03	5.49	5.44	9.65	5.03	3.52
5.10	5.19	5.68	5.61	10.28	5.21	3.66
5.20	5.35	5.84	5.77	10.80	5.39	3.80
5.30	5.48	5.99	5.91	11.22	5.55	3.93
5.40	5.61	6.12	6.04	11.61	5.70	4.04
5.50	5.70	6.22	6.14	11.97	5.83	4.14
5.60	5.78	6.31	6.22	12.26	5.94	4.22
5.70	5.85	6.38	6.30	12.50	6.04	4.28
5.80	5.91	6.44	6.35	12.74	6.14	4.34
5.90	5.97	6.51	6.40	12.99	6.25	4.38
6.00	6.02	6.56	6.45	13.24	6.37	4.42
6.10	6.07	6.61	6.50	13.48	6.51	4.47
6.20	6.13	6.66	6.56	13.73	6.66	4.50
6.30	6.18	6.70	6.62	13.96	6.85	4.54
6.40	6.24	6.74	6.68	14.19	7.03	4.57
6.50	6.28	6.78	6.72	14.44	7.23	4.61
6.60	6.32	6.83	6.76	14.71	7.40	4.65
6.70	6.37	6.87	6.80	14.94	7.55	4.68
6.80	6.42	6.91	6.83	15.15	7.64	4.71
6.90	6.45	6.95	6.86	15.37	7.73	4.74
7.00	6.49	6.98	6.89	15.55	7.79	4.77
7.10	6.53	7.02	6.91	15.71	7.84	4.81
7.20	6.57	7.05	6.94	15.87	7.90	4.83
7.30	6.61	7.09	6.96	16.26	7.95	4.84
7.40	6.66	7.12	6.96	16.36	8.00	4.84
7.50	6.71	7.16	6.96	16.47	8.04	4.85
7.60	6.77	7.20	6.95	16.59	8.05	4.85
7.70	6.84	7.24	6.95	16.72	8.06	4.85
7.80	6.92	7.29	6.94	16.85	8.07	4.85
7.90	7.02	7.35	6.91	16.98	8.09	4.85
8.00	7.14	7.44	6.87	9.35	8.11	4.84

pH	MM	NN	OO	QQ
2.10	-.47	-1.29	-1.69	-.88
2.20	-.51	-1.17	-1.48	-.79
2.30	-.55	-1.04	-1.33	-.74
2.40	-.61	-.97	-1.22	-.70
2.50	-.62	-.88	-1.08	-.64
2.60	-.50	-.77	-.90	-.58
2.70	-.38	-.62	-.70	-.60
2.80	-.27	-.43	-.48	-.44
2.90	-.15	-.22	-.25	-.22
3.00	0.00	0.00	0.00	0.00
3.10	.19	.25	.27	.25
3.20	.39	.50	.55	.53
3.30	.61	.75	.84	.83
3.40	.85	.98	1.12	1.11
3.50	1.08	1.23	1.42	1.39
3.60	1.30	1.51	1.74	1.69
3.70	1.52	1.76	2.04	1.98
3.80	1.73	2.01	2.33	2.28
3.90	1.97	2.29	2.64	2.57
4.00	2.21	2.55	2.94	2.85
4.10	2.49	2.78	3.21	3.10
4.20	2.76	3.00	3.49	3.33
4.30	3.00	3.24	3.75	3.58
4.40	3.23	3.46	4.01	3.83
4.50	3.46	3.67	4.26	4.05
4.60	3.68	3.88	4.49	4.26
4.70	3.89	4.09	4.71	4.46
4.80	4.09	4.28	4.92	4.66
4.90	4.29	4.44	5.12	4.84
5.00	4.49	4.58	5.32	5.01
5.10	4.67	4.73	5.49	5.16
5.20	4.84	4.87	5.65	5.30
5.30	5.01	4.99	5.80	5.42
5.40	5.16	5.10	5.94	5.54
5.50	5.30	5.20	6.05	5.64
5.60	5.46	5.30	6.15	5.74
5.70	5.61	5.38	6.24	5.81
5.80	5.75	5.45	6.31	5.88
5.90	5.88	5.52	6.39	5.94
6.00	6.01	5.60	6.46	6.00
6.10	6.13	5.70	6.52	6.06
6.20	6.25	5.81	6.58	6.11
6.30	6.37	5.92	6.64	6.16
6.40	6.48	6.04	6.70	6.21
6.50	6.58	6.15	6.77	6.26
6.60	6.66	6.24	6.83	6.31
6.70	6.74	6.30	6.89	6.35
6.80	6.82	6.35	6.96	6.39
6.90	6.88	6.40	7.01	6.44
7.00	6.94	6.45	7.07	6.48
7.10	7.00	6.49	7.12	6.52
7.20	7.06	6.52	7.19	6.56
7.30	7.11	6.56	7.26	6.61
7.40	7.16	6.60	7.33	6.66
7.50	7.20	6.63	7.40	6.71
7.60	7.24	6.67	7.47	6.78
7.70	7.28	6.71	7.55	6.85
7.80	7.28	6.75	7.64	6.93
7.90	7.27	6.81	7.74	7.03
8.00	7.27	6.89	7.85	7.13

IV. Model Calculations for the Type 1 Sites

The modified Henderson-Hasselbach equation was used as the basis for non-linear least squares fits of the Type 1 site titration curves. Calculations were performed over the pH range 3 to 6. Model parameters for fits calculated by program NLNOM for the separate fraction titration curves are given in Table 6. Calculation results with NLNOM for the combined titration curves are given in the thesis. Calculations performed subsequent to the thesis with the SAS 76 NLIN program for the combined titration curves are given in Table 7.

The modified Henderson-Hasselbach equation as used for the calculations was:

$$X = C2 / (10^{((pK_a - pH)/N)} + 1) - C1$$

where C2, total number of sites or T(-COOH)

pK_a , a constant (that pH where half the sites are dissociated)

pH, negative log of the hydrogen ion concentration

N, a constant

X, MCMPOC or the μ moles of base consumed/mg OC

Table 6. Parameters from model fit to Type 1 sites for the individual fraction titrations calculated with program NLNOM.

- N, a constant
- pK_a , a constant (that pH where half the sites are dissociated)
- T(-COOH), C2 or the total number of Type 1 sites
- C1, adjustable offset of the titration curve
- SUMSQ, sum of squares, $\sum (X_{\text{observed}} - X_{\text{estimate}})^2$
- n, number of data points used in the calculation

Titration	N	pK _a	T(-COOH) μmoles/mg OC	Cl	SUMSQ	n
GG1371A	1.99	3.59	13.85	3.28	0.0413	16
GG1392A	2.10	3.38	14.82	2.91	0.0224	16
GG2373A	1.64	3.92	4.10	1.36	0.0202	15
GG2421B	1.60	4.10	3.39	1.67	0.0223	10
GG3374B	1.60	3.73	6.09	-1.05	0.0253	16
GG3421B	1.70	3.80	5.08	0.70	0.00275	15
HH1377B	1.91	3.66	14.86	0.93	0.0356	16
HH1399C	2.32	3.13	18.41	4.32	0.0433	16
HH2378B	1.86	3.90	4.56	0.48	0.0216	14
HH2399B	1.66	4.04	3.65	0.67	0.0261	13
HH3378B	1.88	3.67	6.88	0.20	0.0176	16
HH3399B	2.08	3.61	7.05	1.66	0.0087	13
II1380A	1.74	3.70	12.50	0.37	0.0599	17
II1399C	1.76	3.76	11.57	1.04	0.0321	15
II2381B	1.41	4.14	3.70	0.10	0.0115	15
II2404A	1.39	4.08	3.41	0.83	0.0072	12
II3382B	1.81	3.90	7.01	1.27	0.0832	16
II3404A	2.29	3.46	9.20	1.18	0.0044	12
JJ1383B	1.11	4.68	22.28	-3.37	1.041	16
JJ1407A	1.07	4.68	21.23	-0.66	0.852	16
JJ2386A	1.74	3.94	4.47	0.04	0.0096	15
JJ2405A	1.43	4.07	3.83	-0.31	0.0032	13
JJ3387A	2.02	3.51	8.15	1.32	0.0136	15
JJ3405A	1.80	3.71	7.14	-0.11	0.0127	9
KK1383B	2.53	3.39	15.95	2.52	0.0153	12
KK1407A	2.94	3.15	17.88	5.88	0.0357	15
KK2386A	1.40	4.12	3.79	0.59	0.0018	14
KK2408A	1.36	4.18	3.58	2.46	0.0176	14
KK3387A	1.97	3.72	7.74	-3.32	0.0129	15
KK3408A	2.07	3.83	7.11	2.16	0.0147	14
LL1392A	1.28	4.06	5.03	-0.68	0.0091	13
LL1410A	1.32	3.96	5.33	0.04	0.0250	15

Titration	N	pK _a	T(-COOH) μmoles/mg OC	Cl	SUMSQ	n
LL2393A	1.82	4.85	7.06	0.92	0.0394	17
LL2409A	1.70	4.79	6.56	2.22	0.0315	13
LL3393A	1.92	3.94	6.26	0.77	0.0049	16
LL3409A	2.20	3.60	7.80	2.04	0.0096	12
MM1396A	2.85	4.34	15.66	3.40	0.0264	17
MM1410A	2.73	3.96	13.61	4.05	0.0364	17
MM2394B	1.84	3.86	5.09	0.30	0.0096	15
MM2411A	1.54	4.07	3.94	1.56	0.0049	14
MM3394A	1.70	3.80	6.43	1.43	0.0085	14
MM3411A	1.94	3.53	7.59	2.09	0.0147	14
NN1396A	2.28	3.42	13.29	1.49	0.0090	15
NN1413A	2.01	3.65	11.13	1.75	0.0301	16
NN2395A	1.62	4.00	4.04	1.16	0.0026	15
NN2412A	1.51	4.10	3.86	1.12	0.0062	15
NN3395A	1.57	3.87	5.32	1.32	0.0037	14
NN3412A	1.62	3.83	5.73	-0.66	0.0159	15
OO1413A	2.09	3.55	13.96	1.55	0.0135	15
OO1423A	2.09	3.54	14.36	1.95	0.0081	17
OO2414A	1.79	3.95	6.45	0.71	0.0029	13
OO2420A	1.82	3.93	6.12	1.26	0.0026	17
OO3414A	1.94	3.66	8.42	1.54	0.0077	16
OO3420A	1.95	3.66	8.39	1.30	0.0028	15
QQ1423A	2.46	3.10	17.43	5.74	0.0138	13
QQ1426A	1.93	3.51	12.83	2.78	0.0142	16
QQ2424A	2.23	3.54	6.94	2.52	0.0055	12
QQ2425A	1.75	3.96	5.17	1.38	0.0085	14
QQ3424A	1.89	3.71	7.44	2.09	0.0052	14
QQ3425A	2.28	3.35	9.65	3.43	0.0220	13
10.5HrUVQQ1433-2	1.58	3.92	21.65	3.40	0.1724	15
3HrUVQQ1433-4	1.77	3.61	15.30	2.17	0.0243	13
1HrUVQQ1433-6	1.92	3.50	15.39	2.91	0.0104	11

Titration	N	pK _a	T(-COOH) umoles/mg OC	C1	SUMSQ	n
N1237A	1.81	3.44	15.36	3.99	0.0761	12
N1255B	2.02	3.12	22.73	1.79	0.0141	15
N2250B	1.70	4.00	6.90	0.00	0.0324	12
N3247B	1.77	3.81	9.36	-0.56	0.0190	17
P1318A	1.72	3.38	15.45	2.23	0.0355	16
P1340B	2.06	3.03	20.26	4.68	0.0071	15
P2320A	2.10	3.71	8.01	0.82	0.0304	11
P2338	1.98	3.44	8.02	-1.15	0.0113	14
P3322A	2.18	3.69	9.32	0.39	0.0202	15

Table 7. Parameter values and asymptotically valid errors for selected combined titration curves calculated with SAS 76 program NLIN.

TCOOH, C2 or the total number of Type 1 sites
 pK_a , a constant (that pH where half the sites are dissociated)
 N, a constant
 C, adjustable offset of the titration curve

Curve	TCOOH	C2	N	C	pk _a	SE
11	2.33E-2	91.3	92.21	2.44	14.7	0.00000
12	1.91E-2	87.4	87.22	2.12	13.3	0.00000
13	1.52E-2	80.9	80.8	2.04	12.1	0.00000
14	9.91E-3	62.4	61.9	1.44	10.1	0.00000
15	2.72E-2	21.4	24.21	2.14	12.7	0.00000
16	1.70E-2	49.4	48.98	1.93	10.2	0.00000
17	9.92E-3	38.0	36.8	1.74	9.2	0.00000
18	1.19E-2	21.1	20.2	1.66	8.1	0.00000
19	2.07E-2	27.0	25.9	2.07	11.2	0.00000

Table 7. Parameter values and asymptotically valid errors for selected combined titration curves calculated with SAS 76 program NLIN.

TCOOH, C2 or the total number of Type 1 sites

pk_a, a constant (that pH where half the sites are dissociated)

N, a constant

C, adjustable offset of the titration curve

	Estimate	Std. Error	95% Confidence Interval	
<u>Sample N</u>				
TCOOH	13.815	0.267	13.268	14.363
pK _a	3.506	0.026	3.454	3.559
N	1.851	0.031	1.786	1.916
C	4.781	0.237	4.294	5.268

<u>Sample P</u>				
TCOOH	13.509	0.276	12.943	14.075
pK _a	3.328	0.029	3.268	3.388
N	1.955	0.030	1.892	2.018
C	5.434	0.252	4.917	5.950

<u>Sample GG</u>				
TCOOH	9.730	0.211	9.297	10.164
pK _a	3.606	0.028	3.548	3.664
N	1.924	0.039	1.843	2.005
C	3.146	0.182	2.773	3.520

<u>Sample HH</u>				
TCOOH	10.891	0.311	10.253	11.530
pK _a	3.575	0.038	3.496	3.653
N	1.982	0.052	1.874	2.089
C	3.661	0.269	3.109	4.212

<u>Sample II</u>				
TCOOH	9.596	0.247	9.088	10.103
pK _a	3.747	0.030	3.685	3.810
N	1.779	0.048	1.680	1.878
C	2.593	0.207	2.168	3.017

	Estimate	Std. Error	95% Confidence Interval	
<u>Sample KK</u>				
TCOOH	11.617	0.276	11.049	12.184
pK _a	3.562	0.035	3.491	3.634
N	2.380	0.052	2.273	2.487
C	4.257	0.231	3.782	4.732

<u>Sample NN</u>				
TCOOH	8.963	0.121	8.714	9.212
pK _a	3.666	0.017	3.631	3.702
N	1.982	0.026	1.928	2.036
C	2.809	0.102	2.600	3.018

<u>Sample OO</u>				
TCOOH	10.331	0.134	10.056	10.606
pK _a	3.674	0.016	3.640	3.708
N	1.965	0.025	1.913	2.017
C	3.214	0.113	2.983	3.446

<u>Sample QQ</u>				
TCOOH	10.025	0.163	9.690	10.360
pK _a	3.557	0.022	3.512	3.602
N	1.982	0.029	1.922	2.043
C	3.449	0.142	3.158	3.740

V. Programs Used for Calculations

TCRVDI and NLNOM

These programs were used on the laboratory Varian computer system. TCRVDI performs curve difference calculations and was used to subtract blank titration curves from organic sample titration curves. NLNOM performs the least squares fit of the model to the titration curve over a specified pH range.

SAS 76 NLIN

A copy of the cards used for running the SAS 76 NLIN program are given. The Marquardt method was used for all calculations.

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```

1      TITLE TCRVDI
2      C#####
3      C                                     THIS MODULE WILL CRUNCH
4      C      TEST CRVDIF                                     DATA ONLY IT IS PROTO
5      C
6      C
7      C      THIS IS REVISION B :  THIS REVISION INCORPORATES FLEXIBLE I/O
8      C      -- ALSO IT SUPPRESSES THE CORE IMAGE DUMP,
9      C      AND RATHER OUTPUTS ONLY THE VITAL DATA
10     C      *** ALSO NOTE THAT THE VERSION OF CRVDIF ...
11     C      USED HERE IN IS THE MOST CURRENT REVISION
12     C      AND SHOULD BE THE VERSION USED IN THE GLOBAL
13     C      OMTITR SYSTEM.  SR
14     C      *** REV B INCORPORATES SIGN OFF FROM ROOT SEGMENT
15     C      KICKS OUT LAST PAGE
16     C
17     C      REVISION C:  THIS REVISION CORRECTLY INTERPOLATES
18     C      DATA SETS WHICH DO NOT HAVE MATCHING ENDPOINTS
19     C      (IF NO INTERPOLATION IS POSSIBLE THE PROGRAM
20     C      SO NOTIFIES THE OPERATOR.  ADDITIONALLY THE
21     C      PROGRAM NOW SIGNS'OFF TO INDICATE COMPLETION.
22     C
23     C      RIFFLE 28SP76      (SEE OMTITR FOR SYSTEM)
24     C.....
25     C
26     C
27     C      *****NOTE EXTERNAL STMTS ARE RESTRICTED TO ROOTONLY
28     C      EXTERNAL BPF CBS
29     C      COMMON /FCBS/ IBFCB (13), IBLU, IPFCB (13), IPLU /INTERA/INTER
30     C      COMMON /IOSPEC/ LISTLU, IOLUN
31     C..... NOTE ALL ROOTS MUST MAKE ONE WRITE STMT
32     C      THIS PUTS V$FORTIO IN PROG, A MUST
33     C.....
34     C      LET HIM KNOW WHAT'S GOING ON
35     C.....
36     C
37     C      SATISFY FLEXIBLE INTERACTIVE I/O REQMT
38     C-----
39     C      SPECIFY PROGS NAME AS PER TITLE
40     C      WRITE(1,920)
41     C      920  FORMAT('THIS IS ***TCRVDI*REV C**')
42     C      PROVIDE 4 RESPECIFICATION OF LISTLU
43     C      AND IOLUN FROM CURRENT UNITS
44     C      (NOTE THIS IS ALWAYS FIRST DONE AT OC.
45     C
46     C      GO TO 921
47     C      8040  WRITE(IOLUN,922)
48     C      READ(IOLUN,923) LISTLU, IOLUN
49     C      GO TO 924
50     C
51     C      921  WRITE(1,922)
52     C      922  FORMAT(' SPECIFY LISTLU,IOLUN'/' **** *')
53     C      READ(1,923) LISTLU,IOLUN
54     C      923  FORMAT(1X,14,1X,14)
55     C.....
56     C      ECHO
57     C.....
58     C      924  WRITE(IOLUN,920)

```

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```

59      WRITE(IOLUN,923) LISTLU,IOLUN
60      C
61      C
62      C
63      C-----
64      C      PROG REALLY STARTS HERE
65      C-----
66      C
67      84  WRITE(IOLUN,205)
68      205 FORMAT(' DATA TAPE ON DRIVE ?YES=1'/
69      +      ' *#')
70      READ(IOLUN,206) IYES
71      206 FORMAT(1X,12)
72      IF(IYES.NE.1) GO TO 84
73      C
74      C
75      C
76      CALL CRVDIF
77      WRITE(IOLUN,436)
78      436 FORMAT(' ::::TCRVDI BYE*::::')
79      END
80
81      C
82      C
83      C
84      C
85      C
86      C
87      C
88      C
89      C
90      C
91      C
92      C
93      C
94      C
95      C
96      C
97      C
98
99      C*****
100     C  CRVDIF      DOUG'S "CURVE DIFFERENCE" PROG
101     C
102     C      THIS ROUTINE CALCULATES DIFFERENTIAL TITER UPTAKE
103     C      OF SEA WATER SAMPLES BY ORGANIC MATTER, BASED ON
104     C      POTENTIOMETRIC TITRATION WITH OH' RE: WRITEUP
105     C
106     C      THIS IS REVISION C: WHICH ENCORPORATES THE INTERACTIVE
107     C      LOGICAL UNIT SPECIFICATION IN RUNTIME. INITIALLY
108     C      INTEROGATION IS TO THE OPCOM DEVICE.
109     C
110     C      THE INTERPOLATION HAS BEEN CORRECTED TO HANDLE
111     C      NONCOINCIDENT ENDPOINTS, BOTH ENDS, AND THE OPERATOR
112     C      IS NOTIFIED IF INTERPOLATION IS NOT POSSIBLE.
113     C
114     C      ALSO I HAVE OMMITED THE SUPERFLUOUS CORE IMAGE DUMP
115     C      WHICH WAS NEEDED DURING DEBUG SEGMENT.  SR.
116     C

```

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```

117 C
118 C      THIS PROG ASSUMES DATA HAS BEEN PLACED ON LUN 174=MT IN
119 C      THE FORMAT SET FORTH IN WRITE UPFOR CRVIF
120 C
121 C      TO BE PROTOTYPE FOR
122 C      SUBROUTINE (OVLAY)
123 C
124 C      ::: THIS PROG REQUIRES CALLER TO INITIALIZ :::
125 C      ::: COMMON BLOCK /FCBS/ VIA EXTERNAL STMT:::
126 C      ::: REFRENCNG BLOCK DATA PROG BPFCBS :::
127 C      ::: THAT PROG IS OM RESIDENT :::
128 C
129 C      ((CALLING PROG MUST HAVE AT LEAST ONE WRITE STMT))
130 C      ((IF THE PROG IS TO BE RUN AS OV))
131 C      28SP76 RIFFLE
132 C.....
133 C      SUBROUTINE CRVDIF
134 C
135 C      COMMON /IOSPEC/ LISTLU, IOLUN
136 C      COMMON /FCBS/ IBFCB (13), IBLU, IPFCB (13), IPLU /INTERA/INTER
137 C      DIMENSION RPLT (15), IPLOT (60), LABLX (15), LABLY (15)
138 C      DIMENSION DATA (60,6), NCODE (8), NOTE (35), PARAM (12)
139 C      DIMENSION MYFCB (13)
140 C      DATA (RPLT (1),I=1,9)/1.0,1.0,0.0,7.0, 1.0,1.0,+90.,9.0,
141 C      1+1.0/
142 C      DATA (LABLX (1), I=1,15) /7*2H ,2HPPH, 7*2H /
143 C      DATA (LABLY (1),I=1,15) /' M','IC','RO','MO','LE','S ',
144 C      1 'OH',' C','ON','SU','ME','D','MG',' O','C '/
145 C-----
146 C
147 C      GET THE LUNS
148 C      4 DATA AREA ON
149 C      DISC VIA BPFCBS
150 C      (MAIN INITIALIZS)
151 C
152 C      LUN=IBLU
153 C      DO 1 I=1,13
154 C      MYFCB (I)=IBFCB (I)
155 C      CONTINUE
156 C      IREW=0
157 C      CALL V*OPEN (13,LUN,MYFCB,IREW)
158 C
159 C-----
160 C
161 C      SET LOOP PARAMS
162 C      WIL BE 2 PASS'S
163 C
164 C      ISET=1
165 C      ICLEAR=6
166 C      NSET=1
167 C      INDEX=1
168 C      GO TO 3
169 C
170 C      2 ISET=ISET+1
171 C      ICLEAR=4
172 C      NSET=5
173 C      INDEX=7
174 C..... FIRST TIM READ PLT HEDR
175 C      3 IF(ISET.EQ.1) READ (174, 4) (IPLOT (1),I=48,60)
176 C      4 FORMAT(1X,2A2, T7,3A2, T14,4A2, T23,4A2)

```

```
C
C.....READ PARAMS EACH D SET
176 READ(174,5) NCODE (NSET), NCODE (NSET+1), NCODE(NSET+2),
177   1 NCODE (NSET+3)
178   5 FORMAT(1X,4A2)
179   READ(174,60) (NOTE(I),I=1,35)
180   60 FORMAT(1X,35A2)
181     READ(174,61) PARAM(INDEX),PARAM(INDEX+1),PARAM(INDEX+2),
182     1 PARAM(INDEX+3),PARAM(INDEX+4),PARAM(INDEX+5)
183     61 FORMAT(1X,F7.3, T10,F5.2, T16,F7.2, T24,E11.4,
184     1 T36,E11.4, T48,E11.4)
185 C..... CLEAN ARRAY UP
186 DO 51 J=1,ICLEAR
187 DO 6 N=1,60
188 DATA (N,J)=0.0
189   6 CONTINUE
190 51 CONTINUE
191 C.....READ RAW DATA
192 --NOTE (-) VOLUME OR 60 PTS
193 IS THE CURRENT LIMITATION
194 NPairs=0
195   7 NPairs=NPAIRS+1
196   8 READ(174,50) VOLML,EH
197 50 FORMAT(F7.3, T9,F7.2)
198 DATA (NPairs,1)=VOLML
199 DATA (NPairs,2)=EH
200 IF((NPairs.EQ.60).OR.(VOLML.LT.0.0)) GO TO 9
201 GO TO 7
202 C.....KILL FLAG ROW
203 (FLAG IS ANY -VOLML)
204 (THE EH IS ARBITRARY*#0)
205   9 IF(VOLML.LT.0.0) NPAIRS=NPAIRS-1
206 C.....
207 ORDER WRT ML (INC DWN)
208 ORDER3 OM RESIDNT
209 .....
210 MXRDIM=60
211 MXCDIM=6
212 MXRSUB=NPAIRS
213 MXCSUB=2
214 NCOL=1
215 I1DC0=1
216 -----
217 CALL ORDER3(DATA,MXRDIM,MXCDIM,MXRSUB,MXCSUB,NCOL,I1DC0)
218 -----
219 C-----
220 THIS SEGMENT IS PURPOSELY MASKED, FOR FUTURE TEST
221 -----
222 WRITE(LISTLU,1848) ((DATA(J,K),K=1,6),J=1,NPAIRS)
223 C1848 FORMAT(' ',T2,0PF7.3, T10,0PF7.2, T18,0PF8.4, T27, 1PE11.4,
224   1 T39,0PF8.4, T50, 1PE11.4)
225 C=====
```

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```

233 C.....SET ROW COUNT IN CURRENT X
234 IPLOT (10)=NPAIRS
235 C
236 C
237 C
238 C
239 C
240 C.....
241 C
242 C.....CALC MICROMO/ML
243 CONVR=PARAM (INDEX+3)* PARAM (INDEX+5)*(10.**6)
244 CONTINUE
245 IF(ISET.EQ.1) GO TO 70
246 CONVR=(PARAM(1)/PARAM(7))*CONVR
247 C
248 C
249 C
250 C.....
251 C
252 C.....CALC PRELIM PH & CONSUMP
253 70 DO 10 J=1,NPAIRS
254 DATA (J,3)= -((DATA (J,2)-PARAM (INDEX+2))/59.16)
255 IF(ISET.EQ.1) DATA(J,5)=DATA(J,3)
256 DATA(J,4)=DATA(J,1)*CONVR
257 IF(ISET.EQ.1) DATA(J,6)=DATA(J,4)
258 10 CONTINUE
259 C
260 C
261 C
262 C-----
263 C
264 C-----STIK ROW COUNT IN UNUSED
265 IPLOT (38+ISET)=NPAIRS
266 C
267 C
268 C
269 C
270 C.....
271 C
272 C.....WRITE DATA SET ON DISC
273 MYFCB (4)=4
274 IF(ISET.EQ.2) MYFCB (4)= 8
275 C #Z#Z#Z#Z NOTE BINRY WRITES ARE ALWAYS ONE ENTIR SECTR FOR SPEED #Z#
276 WRITE(13) ((DATA (J,K),J=1,60), K=1,4)
277 C
278 C
279 C
280 C
281 C
282 C.....
283 C
284 C.....DUMP CALCS TO STATOS
285 C*** PLEASE NOTE THE VARAIBLE SUBSCRIP PROBLEM INPUT &OUT
286 C
287 C IE., VDM FORTRAN WILL NOT ACCEPT IMPLICIT DO LOOPS IN THE READ
288 C OR WRITE STATEMENT WHEN THE FIRST ELEMENT IS VARIABLE.
289 C.....
290 WRITE(LISTLU,11) NCODE(NSET),NCODE(NSET+1),NCODE(NSET+2),
1 NCODE(NSET+3)

```

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```

291      11 FORMAT('1',4A2)
292      WRITE(LISTLU, 4) (IPLT (I), I=48,60)
293      WRITE(LISTLU,12) (NOTE(I), I=1,35)
294      12 FORMAT(' ',35A2/)
295      C
296      C
297      WRITE(LISTLU,13)
298      13 FORMAT(1X,T4,'WZERO', T11,'XOM', T18,'EZRO',
299      1 T28,'TRO', T39,'THHO', TS1,'TM')
300      WRITE(LISTLU,14) PARAM(INDEX),PARAM(INDEX+1),PARAM(INDEX+2),
301      1 PARAM(INDEX+3),PARAM(INDEX+4),PARAM(INDEX+5)
302      14 FORMAT(1X,0PF7.3, T10,0PF5.2, T16,0PF7.2, T24,1PE11.4,
303      1 T36,1PE11.4, T48,1PE11.4//)
304      C
305      C
306      WRITE(LISTLU,15)
307      15 FORMAT(1X, TS,'ML', T13,'EH', T22,'PH', T30,'MCMOH')
308      C
309      WRITE(LISTLU,16) ((DATA (J,K), K=1,4), J=1,NPAIRS)
310      16 FORMAT(1X, T2,0PF7.3, T10,0PF7.2, T18,0PF8.4, T27,1PE11.4)
311      C
312      C.....GET SECOND IF NOT IN LIST
313      IF(ISET.EQ.1) GO TO 2
314      C
315      C
316      C
317      C
318      C
319      C
320      C
321      C : : : : : PRELIM PROCESS FINISHED : : : : :
322      C
323      C
324      C
325      C
326      C.....
327      C DO LINEAR NEAREST NEIGHBR
328      C INTERPOLATION IF DEFINED
329      C.....
330      C RESET THE "LOWER BRACKET FOUND" FLAG TO NOT FOUND CONDITION.
331      IBRAKT=0
332      C INITILIZE THE NEXT POTENTIAL INTERPOLATABLE POINTS INDEX PARAM
333      L=1
334      C SET THE INDEX POINTER TO THE SECONDARY DATA SETS START
335      K=1
336      C NOW DO SAME FOR THE PRIMARY DATA SET
337      J=1
338      C
339      C
340      C-----
341      C COMPARE THE PRIMARY DATA SETS INDEPENDENT VARIABLE TO THE CURRENT
342      C SECONDARY SETS INDEPENDENT VARIABLES VALUE.
343      C-----
344      17 IF(DATA (J,5).GT.DATA (K,3)) GO TO 18
345      C
346      C
347      C IF A LOWER BRACKET HAS BEEN SET, IT IS THE CLOSEST POINT
348      C AVAILABLE IN THE FURNISHED DATA SET. SINCE THE CLOSEST UPPER

```

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```

349 C   UPPER BOUND, HAS ALSO BEEN FOUND HENCE WE'VE FOUND THE MINIMUM
350 C   INTERPOLABLE INTERVAL.  GO INTERPOLATE.
351 C   IF(IBRAKT.EQ.1) GO TO 19
352 C
353 C
354 C   NO LOWER BOUND HAS YET BEEN SET, HOWEVER IF THE PRIMARY AND
355 C   SECONDARY SETS ARE EQUAL WE HAVE DEGENERATELY INTERPOLATED, SO
356 C   SAVE IT.
357 C   IF(DATA (J,5).EQ.DATA (K,3)) GO TO 20
358 C
359 C
360 C   NO INTERPOLATIONS WERE POSSIBLE OVER ENTIRE INTERVAL IF NEXT TRUE
361 C   IF((J.EQ.IPLOT(39)).AND.((L-1).EQ.0)) GO TO 1001
362 C
363 C   SOME INTERPOLATIONS WERE POSSIBLE, BUT NEAR THE END THEY WERE NOT
364 C   HENCE SAVE THOSE WHICH WERE
365 C   IF(J.EQ.IPLOT(39)) GO TO 22
366 C   ELSE TRY PRIMARY SETS NEXT INDEPENDENT VALUE, NO BRACKET HAVING
367 C   MATERIALIZED.
368 C   J=J+1
369 C   GO TO 17
370 C
371 C
372 C
373 C-----
374 C   IN THIS LOOP WE'RE LOOKING FOR AN UPPER BOUND FOR INTERPOLATION
375 C-----
376 C   EXIT IF LAST SECONDARY'S INDEPENDENT IS LESS THAN THE PRIMARY'S
377 C   FIRST INDEPENDENT POINT (IE., NON COINCIDENT DOMAINS)
378 C   18 IF((K.EQ.IPLOT (40)).AND.((L-1).EQ.0)) GO TO 1001
379 C
380 C   IF THERE ARE NO MORE INTERPOLATIONS POSSIBLE, BUT SOME HAD OCCURRED
381 C   DUMP THE GOOD STUFF TO DISC.
382 C   IF(K.EQ.IPLOT(40)) GO TO 22
383 C
384 C
385 C   BUMP SECONDARY DATA SET'S INDEX 4 NEXT TEST, AND SET BRACKET (INDICATING
386 C   THAT A LOWER BOUND WRT THE PRIMARY POINT IN QUESTION
387 C   HAS BEEN FOUND.
388 C   K=K+1
389 C   IBRAKT=1
390 C   GO TO 17
391 C
392 C
393 C-----
394 C   DO A CLASSICAL LINEAR INTERPOLATION    SEE FIGURE (26SEP76)
395 C-----
396 C   19 DATA (L,2)= (DATA (J,5)-DATA ((K-1),3)) * (DATA (K,4)-
397 C   1 DATA ((K-1),4)) / (DATA (K,3)-DATA ((K-1),3)) + DATA ((K-1),4)
398 C   GO TO 21
399 C
400 C
401 C
402 C   DEGENERATELY INTERPOLATE
403 C
404 C   20 DATA (L,2)=DATA (K,4)
405 C
406 C

```

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```

407 C-----
408 C  CALCULATE THE DIFFERENTIAL DEPENDENT (IE. SEC-PRI) VALUE BASED
409 C    ON THE INTERPOLATION, THEN NORMALIZE WRT FACTOR PARAM (2),
410 C    WHICH FOR THE CASE AT HAND IS THE TOTAL ORGANIC MATTER CONTENT
411 C-----
412 C  21  DATA (L,1)=(DATA (J,6)-DATA (L,2))/PARAM (2)
413 C
414 C
415 C-----
416 C  STORE ALL DATA CORRESPONDING TO A DIFFERENTIAL MEASUREMENT
417 C-----
418 C
419 C  PLACE PRIMARY INDEPENDENT INTO THE RESULT MATRIX
420 C    DATA (L,5)=DATA (J,5)
421 C
422 C  PLACE THE PRIMARY DEPENDENT INTO SAME ARRAY
423 C    DATA (L,6)=DATA (J,6)
424 C
425 C  IF INTERPOLATIONS HAVE BEEN ATTEMPTED OVER ALL
426 C    PRIMARY INDEPENDENT VARIABLES, THEN WE'RE DONE. GO DUMP.
427 C    IF(J.EQ.IPLOT (39)) GO TO 22
428 C
429 C  ELSE BUMP THE INDEX TO THE NEXT PRIMARY INDEPENDENT VALU.
430 C    J=J+1
431 C
432 C  AND INCREMENT THE COUNTER HOLDING THE # OF VALID INTERPOLATIONS
433 C    WHICH HAVE BEEN POSSIBLE TO THE NEXT POTENTIAL VALUE.
434 C    L=L+1
435 C    GO TO 17
436 C
437 C
438 C
439 C-----
440 C  NOTIFY OPERATOR NO INTERPOLATION POSSIBLE
441 C-----
442 C  1001 WRITE(LISTLU,1000)
443 C  1000 FORMAT(' NO INTERP POSSIBLE')
444 C    GO TO 26
445 C
446 C
447 C
448 C.....
449 C                                DUMP FINAL CALC(DATA
450 C                                2 B PLOTD) TO DISC
451 C.....
452 C  22  MYFCB (4)= 12
453 C      WRITE(13) ((DATA (J,K), J=1,60), K=1,2)
454 C      MYFCB (4)= 14
455 C      WRITE(13) ((DATA (J,K), J=1,60), K=5,6)
456 C
457 C
458 C
459 C
460 C.....
461 C                                SET UP PLOT REQ SECTOR
462 C                                (WE ARE PREPARING TO USE BIPLT)
463 C.....
464 C

```

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```

465 C
466 C
467 C
468 C
469     IPLLOT (9) = 14
470     IPLLOT (10) = L
471     IPLLOT (11) = +1
472 C
473     IPLLOT (12) = 12
474     IPLLOT (13) = L
475     IPLLOT (14) = +4
476 C
477     IPLLOT (15) = 0
478     IPLLOT (16) = 0
479     IPLLOT (17) = 0
480 C
481     IPLLOT (1) = 1
482     IPLLOT (3) = +1
483 C
484 C-----
485 C
486 C
487 C-----
488     MYFCB (4) = 3
489     WRITE(13) RPLLOT, IPLLOT, LABLX, LABLY
490 C
491 C
492 C-----
493 C
494 C
495 C-----
496     WRITE(LISTLU, 4334)
497     4334 FORMAT('IPLLOT REQ SECT')
498     WRITE(LISTLU, 8818) RPLLOT
499     8818 FORMAT(1P5E10.3)
500     WRITE(LISTLU, 8819) (IPLLOT(I), I=1, 47)
501     8819 FORMAT(1X, 12(16, 1X))
502     WRITE(LISTLU, 12) (IPLLOT(I), I=48, 60)
503     WRITE(LISTLU, 12) LABLX
504     WRITE(LISTLU, 12) LABLY
505 C
506 C-----
507 C
508 C
509 C-----
510     WRITE(LISTLU, 6543) LUN, (MYFCB(I), I=8, 10)
511     6543 FORMAT(///' BINARY DATA SECTORS ON'/' LUN=', I3, 3X, 'FIL=', 3A2/
512     1' 1=SYSTM', 3X, '2=SYSTM', 3X, '3=PLOTREQ'/'
513     1' 4=ML PRI', 3X, '5=EH PR', 3X, '6=PH PR', 3X, '7=PMCMOH'/'
514     1' 8=ML SEC', 3X, '9=EH SE', 3X, '10=PH SE', 3X, '11=SMCMOH'/'
515     1' 12=MCNPOC', 3X, '13=SMCMOH*', 3X, '14=PH PRI (INTERPOLATABLE)'/'
516     1' 15=PMCMOH (F(PH PRI))')
517 C
518 C
519 C
520 C-----
521 C
522 C-----

```

FIRST X
NOTE L IS THE INDEX OF THE INTERPOL-
ATABLE DATA POINTS ARRAY SEE
SOURCE REGION 300, LININTERPOL.

THEN Y1

SET END Y AXI FLAGS

WE WANT LEDG AND BX&LN

DUMP PLOT REQ SECT DISC
(REMEMBER WE POINT TO 3)

SHOW HIM PLOT REQ
FOR FUTURE REFERENCE

DISC FORMAT POST CRUNCH.....

THEN SHOW HOW HIS DATA
DISC AREA WAS WRITTEN

DUMP DAT 2B PLOTD
TO STATOS

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```

523 C.....
524     WRITE(LISTLU, 23)
525 23   FORMAT('1 ')
526     WRITE(LISTLU, 4) (IPLT (I), I=48,60)
527 C
528     WRITE(LISTLU, 24)
529 24   FORMAT(1X/' ', T12, 'H ACTIVITY' / T5, 'PH', T14, 'MCMPOC',
530 1     T26, 'PNCMOH', T38, 'SMCMOH')
531 C
532     DO 26 J=1,L
533     WRITE(LISTLU, 25) DATA (J,5), DATA (J,1), DATA (J,6), DATA (J,2)
534 25   FORMAT(1X,0PF8.4, T12,1PE10.3, T24,1PE10.3, T36,1PE10.3)
535 C
536 C
537 C
538 C
539 C
540 26   CONTINUE
541 C KICK OUT LAST PAGE
542     WRITE(LISTLU,1002)
543 1002 FORMAT(' ***CRVDIF BYE***')
544     WRITE(LISTLU,23)
545 C
546 C
547 C
548 C.....
549 C                                     CLOSE PLOT FILE OHNE UPDATE
550 C.....
551     CALL VSCLOS(13,0)
552 C
553 C                                     RETURN TO ROOT SEGMENT
554                                     ONTITR (IF AS OVLAY)
555     RETURN
556     END
557
558 '()'()

```

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```

1 C#####
2 C#####
3 C#####
4 C
5 C      NLNOM - VI77 WITH DISC WRITE      HUIZENG
6 C#####
7 C      NLNOM - A NONLINEAR LEAST-SQUARES FIT TO OM TOTRATION DATA
8 C      WITH A FOUR PARAMETER MODIFIED HENDERSON-HASSELBACH
9 C      RELATIONSHIP.
10 C      DEPENDENT VARIABLE X IS THE MCMPOC (OH CONSUMED BY OM)
11 C
12 C       $X = C2 / (10^{((PK - PH(1)) / N) + 1}) - C1$ 
13 C
14 C      DERIVED FROM RELATIONSHIP
15 C       $PH = PK + N \log_{10}(\alpha / (1 - \alpha))$ 
16 C      WHERE ALPHA IS DEGREE OF DISSOCIATION
17 C
18 C      IN THE FORM APPLIED TO THIS DATA
19 C       $PH = PK + N \log((X + C1) / (C2 - (X + C1)))$ 
20 C      OH CONSUMED BY OM      X=MCMPOC
21 C      C1=SHIFT OF CURVE
22 C TOTAL # OF SITES      C2=TMCMPOC
23 C
24 C
25 C
26 C#####
27 C#####
28 C      DISC WRITE TO LUN=23 SECT 4&8 FILE=IBINRY
29 C
30 C      TITLE NLNOM
31 C      DIMENSION SUMSQ(2),PH(60),X(60), IFCBUD(13)
32 C      DIMENSION IDUMMY(120), AMODEL(60), ADIFF(60)
33 C      DATA IFCBUD (3) / ' ', (IFCBUD (1), I=8, 10) / 'IB', 'IN', 'RY' /
34 C      IREW=0
35 C
36 C
37 C      GET DATA AS STORED BY TCRVDI ON FILE IBINRY
38 C
39 C
40 C      CALL V*OPEN(13,23,IFCBUD,IREW)
41 C      IFCBUD (4)=14
42 C      READ(13) PH
43 C      IFCBUD (4)=12
44 C      READ(13) X
45 C      IFCBUD (4)=3
46 C      READ(13) IDUMMY
47 C      NUMBER=IDUMMY (40)
48 C      WRITE(1,100)
49 C      100 FORMAT('1 THIS IS NLNOM')
50 C      WRITE(1,102)
51 C      102 FORMAT(' INPUT LISTLU, IOLUN')
52 C      WRITE(1,106)
53 C      106 FORMAT(' #### *###')
54 C      READ(1,108) LISTLU, IOLUN
55 C      108 FORMAT(1X,14,1X,14)
56 C      WRITE(IOLUN,100)
57 C      WRITE(LISTLU,100)
58 C      WRITE(IOLUN,109)

```

AD-A055 157

RHODE ISLAND UNIV KINGSTON GRADUATE SCHOOL OF OCEANO--ETC F/G 8/10
SUPPLEMENTAL DATA REPORT ON INVESTIGATIONS OF MARINE DISSOLVED --ETC(U)
MAY 78 D L HUIZENGA

N00014-76-C-0226

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AD
A055 157



END

DATE
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DDC

NL

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```

59 109 FORMAT(' INPUT STARTING VALUES: C1 C2 PK N')
60 WRITE(IOLUN,110)
61 110 FORMAT(' ###.### ###.### ###.### ###.###')
62 READ(IOLUN,112) C1, C2, C3, C4
63 112 FORMAT(1X,F8.4,1X,F8.4,1X,F8.4,1X,F8.4)
64 WRITE(IOLUN,114)
65 114 FORMAT(' WHAT PH RANGE?')
66 WRITE(IOLUN,116)
67 116 FORMAT(1X,'###.### ###.###')
68 READ(IOLUN,118) PHMIN, PHMAX
69 118 FORMAT(1X,F7.3,1X,F7.3)
70 WRITE(IOLUN,120)
71 120 FORMAT(' CONVERGENCE CRITERION')
72 WRITE(IOLUN,122)
73 122 FORMAT(1X,'##### IN E FORMAT ')
74 READ(IOLUN,124) CONV
75 124 FORMAT(1X,E8.5)
76 WRITE(IOLUN,121)
77 121 FORMAT(' WRITE MODEL CURVE TO DISC? 1=YES'/1X,'+')
78 READ(IOLUN,123) IDISC
79 123 FORMAT(1X,I2)
80 SUMSQ=-1.
81 K=1
82 WRITE(LISTLU,126) CONV, PHMIN, PHMAX
83 126 FORMAT(' ITERATIVE PROCEDURE CONV=',1PE13.6,' PH RANGE ',
84 +0PF7.3,' - ',0PF7.3)
85 WRITE(LISTLU,128) K,C1,C2,C3,C4
86 128 FORMAT('0',I6,4(1X,1PE13.6))
87 150 C=0.434294
88 F1F1=0.
89 F1F2=0.
90 F1F3=0.
91 F1F4=0.
92 F2F2=0.
93 F2F3=0.
94 F2F4=0.
95 F3F3=0.
96 F3F4=0.
97 F4F4=0.
98 CF0=0.
99 CF1=0.
100 CF2=0.
101 CF3=0.
102 CF4=0.
103 PK=C3
104 AN=C4
105 SUMSQ (2)=0.
106 SUMSQ (1)=0.
107 C
108 C
109 C
110 C
111 C
112 C
113 DO 200 I=1,60
114 IF(PH(I).LT.PHMIN) GO TO 200
115 IF(PH(I).GT.PHMAX) GO TO 300
116 VAR=EXP((PK-PH(I))/(C*AN))

```

NOW CALCULATE THE DERIVATIVES OF THE FUNCTION WITH RESPECT
 TO EACH OF THE CONSTANTS TO BE DETERMINED.
 CALCULATE THE SUMS OF DERIVATIVE PRODUCTS.

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```

117 F1=-1.
118 F2=1./(VAR+1.)
119 F3=-C2*VAR/(C*AN*(VAR+1.))**2)
120 F4=-C2*(PK-PH(1))*VAR*(-1.0)/(C*(AN*(VAR+1.))**2)
121 F=C2/(VAR+1)-C1
122 F1F1=F1F1+F1*F1
123 F1F2=F1F2+F1*F2
124 F2F1=F1F2
125 F1F3=F1F3+F1*F3
126 F3F1=F1F3
127 F1F4=F1F4+F1*F4
128 F4F1=F1F4
129 F2F2=F2F2+F2*F2
130 F2F3=F2F3+F2*F3
131 F3F2=F2F3
132 F2F4=F2F4+F2*F4
133 F4F2=F2F4
134 F3F3=F3F3+F3*F3
135 F3F4=F3F4+F3*F4
136 F4F3=F3F4
137 F4F4=F4F4+F4*F4
138 CF0=CF0+(X(1)-F)**2
139 CF1=CF1+(X(1)-F)*F1
140 CF2=CF2+(X(1)-F)*F2
141 CF3=CF3+(X(1)-F)*F3
142 CF4=CF4+(X(1)-F)*F4
143 200 CONTINUE
144 300 IF(SUMSQ0.LT.0.) GO TO 310
145 IF(SUMSQ0.GE.CF0) GO TO 301
146 CF0=SUMSQ0
147 GO TO 700
148 301 IF(((SUMSQ0-CF0)/CF0).LT.CONV) GO TO 1000
149 X WRITE(LISTLU,302) K,C1,C2,C3,C4,CF0
150 X302 FORMAT(1X,16,5(1X,1PE13.6))
151 C
152 C
153 C
154 C DO MATRIX ALGRBRA TYPE CALCULATIONS.
155 C D IS MATRIX OF THE GENERAL EQUATIONS WITH NO REARRANGMENTS.
156 C D1,D2,D3,D4 ARE MATRICES WITH RIGHT HAND SIDE OF THE SET
157 C OF EQUATIONS SUBSTITUTED FOR THE
158 C COLUMN N.
159 C
160 C WHAT ALL THIS DOES IS TO SOLVE THE SET OF FOUR EQUATIONS
161 C BY DOING CALCULATIONS ON 4X4 MATRICES.
162 C
163 C
164 310 D=F1F1*(F2F2*(F3F3*F4F4-F4F3*F3F4)-F2F3*(F3F2*F4F4-F4F2*F3F4)+
165 +F2F4*(F3F2*F4F3-F4F2*F3F3))
166 +-F1F2*(F2F1*(F3F3*F4F4-F4F3*F3F4)-F2F3*(F3F1*F4F4-F4F1*F3F4)
167 ++F2F4*(F3F1*F4F3-F4F1*F3F3))
168 ++F1F3*(F2F1*(F3F2*F4F4-F4F2*F3F4)-F2F2*(F3F1*F4F4-F4F1*F3F4)
169 ++F2F4*(F3F1*F4F2-F4F1*F3F2))
170 +-F1F4*(F2F1*(F3F2*F4F3-F4F2*F3F3)-F2F2*(F3F1*F4F3-F4F1*F3F3)
171 ++F2F3*(F3F1*F4F2-F4F1*F3F2))
172 311 D1=(CF1*(F2F2*(F3F3*F4F4-F4F3*F3F4)-F2F3*(F3F2*F4F4-F4F2*F3F4)+
173 +F2F4*(F3F2*F4F3-F4F2*F3F3))
174 +-F1F2*(CF2*(F3F3*F4F4-F4F3*F3F4)-F2F3*(CF3*F4F4-CF4*F3F4)

```

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```

175      ++F2F4*(CF3*F4F3-CF4*F3F3))
176      ++F1F3*(CF2*(F3F2*F4F4-F4F2*F3F4)-F2F2*(CF3*F4F4-CF4*F3F4)
177      ++F2F4*(CF3*F4F2-CF4*F3F2))
178      ++F1F4*(CF2*(F3F2*F4F3-F4F2*F3F3)-F2F2*(CF3*F4F3-CF4*F3F3)
179      ++F2F3*(CF3*F4F2-CF4*F3F2)))/D
180 320    D2=(F1F1*(CF2*(F3F3*F4F4-F4F3*F3F4)-F2F3*(CF3*F4F4-CF4*F3F4)+
181      +F2F4*(CF3*F4F3-CF4*F3F3))
182      +-CF1*(F2F1*(F3F3*F4F4-F4F3*F3F4)-F2F3*(F3F1*F4F4-F4F1*F3F4)
183      ++F2F4*(F3F1*F4F3-F4F1*F3F3))
184      ++F1F3*(F2F1*(CF3*F4F4-CF4*F3F4)-CF2*(F3F1*F4F4-F4F1*F3F4)
185      ++F2F4*(F3F1*CF4-F4F1*CF3))
186      +-F1F4*(F2F1*(CF3*F4F3-CF4*F3F3)-CF2*(F3F1*F4F3-F4F1*F3F3)
187      ++F2F3*(F3F1*CF4-F4F1*CF3)))/D
188 330    D3=(F1F1*(F2F2*(CF3*F4F4-CF4*F3F4)-CF2*(F3F2*F4F4-F4F2*F3F4)+
189      +F2F4*(F3F2*CF4-F4F2*CF3))
190      +-F1F2*(F2F1*(CF3*F4F4-CF4*F3F4)-CF2*(F3F1*F4F4-F4F1*F3F4)
191      ++F2F4*(F3F1*CF4-F4F1*CF3))
192      ++CF1*(F2F1*(F3F2*F4F4-F4F2*F3F4)-F2F2*(F3F1*F4F4-F4F1*F3F4)
193      ++F2F4*(F3F1*F4F2-F4F1*F3F2))
194      +-F1F4*(F2F1*(F3F2*CF4-F4F2*CF3)-F2F2*(F3F1*CF4-F4F1*CF3)
195      ++CF2*(F3F1*F4F2-F4F1*F3F2)))/D
196 340    D4=(F1F1*(F2F2*(F3F3*CF4-F4F3*CF3)-F2F3*(F3F2*CF4-F4F2*CF3)+
197      +CF2*(F3F2*F4F3-F4F2*F3F3))
198      +-F1F2*(F2F1*(F3F3*CF4-F4F3*CF3)-F2F3*(F3F1*CF4-F4F1*CF3)
199      ++CF2*(F3F1*F4F3-F4F1*F3F3))
200      ++F1F3*(F2F1*(F3F2*CF4-F4F2*CF3)-F2F2*(F3F1*CF4-F4F1*CF3)
201      ++CF2*(F3F1*F4F2-F4F1*F3F2))
202      +-CF1*(F2F1*(F3F2*F4F3-F4F2*F3F3)-F2F2*(F3F1*F4F3-F4F1*F3F3)
203      ++F2F3*(F3F1*F4F2-F4F1*F3F2)))/D
204      Y=1.
205      K=K+1
206      C
207      C
208      C
209      C
210      C
211      C
212      C
213      C
214 400    DO 500 I=1,2
215      A1=FLOAT(I)/Y
216      CE1=C1+D1*A1/2.
217      CE2=C2+D2*A1/2.
218      CE3=C3+D3*A1/2.
219      CE4=C4+D4*A1/2.
220      DO 500 J=1,60
221      IF(PH(J).LT.PHMIN) GO TO 500
222      IF(PH(J).GT.PHMAX) GO TO 600
223      VAR=EXP((CE3-PH(J))/(C*CE4))
224      XV=CE2/(VAR+1) - CE1
225      DIFF=X(J)-XV
226      SUMSQ(I)=SUMSQ(I)+DIFF**2
227 500    CONTINUE
228 600    CONTINUE
229      C
230      C
231      C
232      C

```

NOW DO CALCULATION OF SUM OF SQUARES WITH BOTH
THE FULL CORRECTION TO THE FOUR PARAMETERS
DETERMINED ABOVE AND WITH 1/2 THE CORRECTION.

CALCULATE THE AMOUNT OF THE CORRECTION TO BE MADE WHICH WILL
YIELD THE LOWEST SUM OF SQUARES.

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```

233 C SOLUTION TO QUADRATIC EQUATION GIVES AMOUNT TO APPLY.
234 C
235 C
236 VMIN=0.5/Y+0.25/Y*(CF0-SUMSQ (2))/(SUMSQ (2)-2.*SUMSQ (1)+CF0)
237 C
238 IF CALCULATED VMIN IS LESS THAN 0 GO BACK AND DO THE
239 CALCULATIONS AGAIN ONLY HALVE THE INTERVAL OVER WHICH
240 THE CALCULATIONS ARE MADE.
241 C
242 C
243 IF(VMIN.LT.0.) GO TO 700
244 SUMSQ0=CF0
245 C1=C1+VMIN*D1
246 C2=C2+VMIN*D2
247 C3=C3+VMIN*D3
248 C4=C4+VMIN*D4
249 GO TO 150
250 700 Y=Y*2.
251 C
252 ONLY ALLOW THIS SHORTENING OF THE INTERVAL TO GO SO FAR
253 C
254 IF(Y.GT.130.) GO TO 1000
255 GO TO 400
256 1000 WRITE(LISTLU,1001) K
257 1001 FORMAT('0CONVERGENCE CRITERION MET NUMBER OF ITERATIONS=',I4)
258 C*****
259 C WRITE TO DISC THE MODEL CURVE AND RESIDUALS
260 C LUN=23 FILE=IBINRY
261 C SECT 4 MODEL CALCULATIONS
262 C SECT 8 RESIDUALS
263 C*****
264 IF(IDISC.NE.1) GO TO 1200
265 IERROR=0
266 1009 DO 1100 I=1,NUMBER
267 VAR=EXP((C3-PH(I))/(C*C4))
268 AMODEL(I)=C2/(VAR+1)-C1
269 ADIFF(I)=X(I)-AMODEL(I)
270 1100 CONTINUE
271 IFCBUD(4)=4
272 WRITE(13) AMODEL
273 IFCBUD(4)=8
274 WRITE(13) ADIFF
275 1200 CALL VSCLOS(13,IREW)
276 C*****
277 C*****
278 C
279 C OUTPUT FINAL PARAMETERS
280 C
281 C
282 WRITE(LISTLU,1002) C1
283 1002 FORMAT('0 C1= ',F8.4)
284 WRITE(LISTLU,1003) C2
285 1003 FORMAT(' C2= ',F8.4)
286 WRITE(LISTLU,1004) C3
287 1004 FORMAT(' PK= ',F8.4)
288 WRITE(LISTLU,1005) C4
289 1005 FORMAT(' N= ',F8.4)
290 WRITE(LISTLU,1006) CF0

```

PAGE 6 08/09/77 VORTEX CTUF 831 HOURS

```
291 1006 FORMAT(' SUM OF SQUARES = ',1PE13.6)
292      WRITE(LISTLU,1008) NUMBER
293 1008 FORMAT(IX,'# OF POINTS IS ',14)
294      WRITE(LISTLU,1007)
295      WRITE(10LUN,1007)
296 1007 FORMAT(' *****NLNOM BYE*****')
297      END
```

Copy of cards used to run the SAS 76 NLIN program for non-linear least squares model of combined titration curves.

1
NOTE: THE JOB ABC HAS BEEN RUN UNDER RELEASE 76.5 OF SAS AT THE UNIVERSITY OF RHODE ISLAND.

2
DATA HH;
3 INPUT PH Y;
CARDS;

NOTE: DATA SET WORK.HH HAS 31 OBSERVATIONS AND 2 VARIABLES.
NOTE: THE DATA STATEMENT USED 0.35 SECONDS AND 94K.

35
36 PROC PRINT;

NOTE: THE PROCEDURE PRINT USED 0.41 SECONDS AND 102K AND PRINTED PAGE 1.

37
38 PROC NLIN METHOD=MARQUADT;

39 PARAMETERS
TCOOH=10.0
PKA=3.5
N=1.5
C=1.0;
40
41 TCOOH>=0.
42 PKA>=0.
43 N>=0.
44 -10.<C<10. ;

45
46
47
48
49
50
51
52
53

A=0.434294;

AN=N*A;

MODEL Y=TCOOH/(EXP((PKA-PH)/AN)+1)-C;

DER.TCOOH=(EXP((PKA-PH)/AN)+1)**(-1);

DER.PKA=-TCOOH*EXP((PKA-PH)/AN)/(AN*(EXP((PKA-PH)/AN)+1)**2);

DER.N=TCOOH*(PKA-PH)/A*EXP((PKA-PH)/AN)/(N*(EXP((PKA-PH)/AN)+1)**2);

DER.C=-1.;

OUTPUT OUT=DATA PREDICTED=P RESIDUAL=R;

NOTE: DATA SET WORK.DATA HAS 31 OBSERVATIONS AND 4 VARIABLES.

NOTE: THE PROCEDURE NLIN USED 2.32 SECONDS AND 156K AND PRINTED PAGES 2 TO 3.

33
34 PROC PRINT;

VAR P R;

NOTE: THE PROCEDURE PRINT USED 0.48 SECONDS AND 102K AND PRINTED PAGE 4.

NOTE: BARR, GOODNIGHT, SALL AND HELWIG
SAS INSTITUTE INC.
P.O. BOX 10066
RALEIGH, N.C. 27605

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